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ABSTRACT

A study was conducted by the Chancellor's Office of the California Community Colleges (CCC) to examine the consequences of existing fee policies and the likely impact of possible changes in the fee structures. The study simulated the consequences of three different fee proposals for the CCC system: an annual fee increase of $50 ($30 for those taking less than six units); an annual increase of $60 ($40 for those taking less than six units); and an annual fee increase or tuition of $4 per unit. Major findings, based on research and simulation modeling and a review of existing studies, included the following: (1) an increase in fees or tuition would result in a proportionately greater loss of enrollment in the CCC system than in the State University (CSU) or University of California (UC) system, which were also proposing fee increases; (2) the greatest enrollment losses would be among self-supporting and low-income students; (3) increased fees or tuition would only be partially offset by student financial aid; and (4) proposed fee increases by the CSU and UC systems would be likely to affect CCC enrollments, though the result would probably be less than a 1% enrollment increase in the CCC system. The bulk of the report consists of appendices providing an analysis of price elasticity of demand for CCC enrollment; an enrollment/price simulation model; fee structures for 1976-1981; a national comparison of fees and enrollment; an analysis of the distributional impact of CCC education (i.e., who pays and who benefits); and a fee increase simulation. (HB)

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ANALYSIS OF TUITION AND FEES

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JC 820 145

CHANCELLOR'S OFFICE
ANALYTICAL STUDIES UNIT

Sacramento
December, 1981

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PREFACE

The question of appropriate sharing of costs for public services between users and general taxpayers is becoming increasingly important in California. This question is particularly significant for the public community colleges. Traditionally, these institutions have been nearly free of cost to students who are California residents.

This analysis is intended to serve as an information base for use by policy-makers as they consider the issue. Findings presented here do not argue the relative advantages or disadvantages of charging fees or imposing tuition.

The general consequences of existing fee policies are assessed in this analysis. In addition, new empirical research on the community college student makes it possible to simulate the likely consequences for both students and colleges of possible changes in fee policies. While statewide simulations of three specific fee proposals are presented, the model can be applied to other fee proposals and to district or college conditions as well.

Leonard Shymoniak, Tom Tanner, Taron Reeves, and Gary Paque of the Chancellor's Office Analytical Studies Unit prepared the programs and compiled data necessary for the analysis. Questions about this study or the simulation model should be directed to the Analytical Studies Unit.

Chuck McIntyre
Director of Analytical Studies

December, 1981

Analytical Studies Unit
Chancellor's Office
California Community Colleges
December 12, 1981

ANALYSIS OF TUITION AND FEES
CALIFORNIA COMMUNITY COLLEGES

This paper analyzes the consquences of existing and proposed student charges in the California Community Colleges. The analysis is based on new research and simulation modeling by staff of the Chancellor's Office, together with review of other existing studies. Nine major findings are emphasized. Following that, the simulated consequences of three different fee proposals are presented. While the base data and conclusions of this paper are for statewide aggregates, the differing impacts on individual districts can be estimated by the same model.

MAJOR FINDINGS

First, a given increase in fees or tuition would result in a much greater proportionate loss of enrollment in the California Community Colleges (CCC's) than in either the State University (CSU) or University (UC) systems. This is because the existing cost of enrollment at CCC's is less and because CCC students are likely to be more responsive to a price increase than are CSU or UC students.

Existing fees and other enrollment-related costs for CCC students are $200 and $800 less per year than those for CSU and UC students, respectively. Consequently, a $50 or $100 increase in fees constitutes a greater proportionate increase for CCC students than for UC or CSU students. For that reason alone, a greater percentage loss in CCC enrollment can be expected from a like fee increase in the three segments.

In addition, however, CCC students are expected to be more responsive to proportionately equal price increases because they (CCC students) more often are self-supporting and low income and possess less academic preparation than their counterparts at the four-year institutions (see Appendix A).

Existing literature suggests that a ten percent increase in cost at a four-year college or university results in a three to four percent decrease in enrollment. Specific research on community college students indicates that a ten percent increase in cost would result in a much larger enrollment loss, ranging from five percent to eight percent. And, while it can't be estimated, the psychological impact of CCC's imposing "tuition" for the first time is likely to be substantial.

Second, research findings that are used to specify parameters for the simulation model indicate the greatest CCC enrollment losses from fee increases will be among students who are self-supporting and low income (see Appendix B). Because of these factors, the largest proportionate losses will occur also among females and minorities. These estimates are based on the knowledge that the majority of low income, self-supporting students are female and that whites comprise a greater proportion of high income students than of low income students. Smallest proportionate losses would occur among males and whites. Losses among different age groups and among those with different levels of prior education or in different programs will depend upon the specific type of fee increase.

Third, increased costs to students, such as fees or tuition, would be partially offset by existing student financial aids, largely in the form of federal Pell Grants. For several reasons, however, these financial aids offset less than half of any cost increase, even for the most needy students. Basic Pell Grants are limited to one-half of cost increases and cannot be provided to students carrying less than a half-time academic load. Fifty-four percent of CCC students are enrolled less than half-time. And, many of those CCC students who are eligible for aid do not apply either because they are unaware or unwilling. Less than sixty percent of those CCC students dependent upon parental incomes below $12,000 per year (and generally eligible for aid) applied for Basic Grants in 1980.

The future of federal student financial aid is clouded by the administration's proposed cutbacks for fiscal 1982. Student financial aid would be forthcoming after such changes in appropriations and, in the case of campus-based programs, some delay to recalculate California costs. The ability of state aid programs such as EOPS and Cal Grants to fill the gap is limited by the amount of funds available and criteria for eligibility.

Fourth, the impact of various tuition and fee proposals on CCC revenues depends largely on (a) how the fee is charged: whether it is a flat charge per student or a per-unit levy, etc.; (b) the assumed price response and consequent estimate of enrollment loss; (c) whether the fee revenues supplement or supplant existing tax revenues; and (d) whether some part of the fee revenue can be turned back into student financial aid so as to minimize the reduction in access.

Without new student financial aid programs, the possible enrollment loss may be so large that apportionment reductions exceed increases in tuition revenues, thereby resulting in a net loss in total CCC revenue. However, all proposals produce an increase in revenue per average daily attendance (ADA) since there are fewer students.

Fifth, fee increases proposed by CSU ($216 per year) and UC ($300 per year) would, if adopted, result in some lower division students switching from UC and CSU to the CCC's. While possible numbers of such students can't be estimated with any precision, they likely would amount to less than one percent of total CCC enrollment or less than two percent of CCC ADA.

Sixth, fees paid by CCC students have increased dramatically since the passage of Proposition 13 (see Appendix C). Immediately after Proposition 13, approximately 2,000 noncredit fee-supported classes were scheduled. Nearly 900 of

these classes were cancelled when fees were charged and resulting enrollments were insufficient to make the classes self-supporting. Despite such consequences, fees have been increased and revenues from fee classes last year totalled $4.8 million, as opposed to $1 million in 1977-78. Various fee increases during the past four years are estimated at:

Nonresident Tuition	137.7%
Fees for Classes	361.3
Other Fees	61.8

in contrast to other increases of:

Enrollment	4.7%
ADA	2.0
Community College Price Index	31.0

The support of community services has shifted from mostly taxes to almost entirely user fees.

Seventh, despite these fee increases, CCC's still levy the lowest student charges of any group of public postsecondary institutions in the nation (see Appendix D). The average CCC fee of $11 was well below the median national community college tuition and fee charge of $443 during 1980-81.

Similarly, CSU fees of $229 that same year were the lowest among comparable four-year institutions across the nation. By contrast, UC fees were about average among doctoral-granting public research universities.

Eighth, CCC's provide a level of access that is unparalleled across the country. One of every twelve adults (or one of every seventeen total individuals) in California was enrolled in community college instruction during the Fall 1980. Further, the number of individuals involved in CCC community services likely exceeded the number formally enrolled in instruction.

Only Arizona and Washington provide their citizens access to community colleges at a level that is close to California, These states enrolled about one of every twenty-four individuals from their populations in community college credit instruction during Fall 1980. The average state enrolled one in every sixty-seven of its population in a community college during Fall 1980.

Ninth, the present redistribution of educational opportunities through CCC's appears to be "progressive"; that is, providing opportunities to those low income individuals who, traditionally, have not obtained a postsecondary education (see Appendix E).

A typical criticism of public tax support for postsecondary education is that lower income taxpayers subsidize students from higher income backgrounds and, therefore, the "redistributive" consequences of postsecondary education are "regressive." It is argued further that student tuition with effective financial aids for those unable to pay would result in a more equitable redistribution of educational opportunities; i.e., actually enhance access. This may well be true of most four-year institutions, including CSU and UC.

By contrast, available evidence suggests that those who benefit from CCC education are from lower income categories than are those who pay for part of that education through tax subsidies (see Appendix E). Two-thirds of CSU and UC students are dependent upon parents in the middle to upper income brackets. Only one-fourth of CCC students are in similar situations.

ANALYSIS OF THREE FEE PROPOSALS

The statewide consequences of three different CCC fee increase proposals are examined for this paper:

(A) annual fee increase of $50 ($30 for those taking less than 6 units) with increases in existing financial aids (Pell Grants, etc.);

(B) annual fee increase of $60 ($40 for those taking less than 6 units) but with increases in existing financial aids matched by new financial aids from up to one-third of the fee revenue; and

(C) annual fee increase or tuition of $4 per unit with increases in existing financial aids.

(A) It is estimated that proposal (A), the annual fee increase of $50 ($30 for those taking less than 6 units), would produce just over $50 million in fee revenue or about a three percent increase in total CCC revenue (see Table 1). Even assuming that added federal, but not state, financial aid becomes available, the possible loss in enrollment is between 55,000 and 88,000 students: four to six percent (see Table 2), depending on whether the low estimate (-0.5) or higher estimate (-0.8) of price response (elasticity) prevails. This loss in students results in a loss of apportionments to CCC's of between $36 million and $58 million. Thus, while total CCC revenues might remain about the same, the level of revenue per student could increase by as much as five percent since there would be fewer students.

The largest proportionate enrollment losses from proposal (A) occur among those individuals carrying six to eight units. This is due to the flat $30 increase, levied without regard to academic load. Losses are relatively greater among the self-supporting and low income, despite the assumed increases in existing financial aids.

The loss in females exceeds that of males by one-third. Not only are there more CCC female students, but they more often are self-supporting and low income. The smallest losses are among those students under 22 years-of-age, and over 62 years-of-age. By contrast, the greatest loss is among those between 22 and 29 years-of-age since they carry moderate academic loads (often two courses) and are more likely to be self-supporting and low income.

Enrollment losses are significantly greater among minorities, particularly blacks, than among whites. Finally, those with bachelors' degrees are least affected since they have higher incomes.

Estimates by the California Postsecondary Education Commission (CPEC) for the same CCC fee increase proposal, i.e., $50 and $30, show a smaller 3.6 percent enrollment loss and, therefore, a net increase of $13 million in total revenues, as well as an increase in revenue per student (see Appendix F). The smaller enrollment loss estimated by CPEC is due largely to their use of lower price-response estimates, at levels similar to those of four-year college students. CPEC further estimates that a distribution of $4 million in new student financial aid would induce about one-fourth of the "departing" students to remain, thereby reducing the possible enrollment loss to 2.7 percent.

(B) A somewhat higher annual CCC fee increase of $60 ($40 for part-time students), but with up to one-third of the fee revenue used for new student financial aids, would produce quite different results than those described for the fee proposal (A) above. Resulting enrollment losses are estimated at between four and seven percent (see Table 3), somewhat larger than those estimated to result from proposal (A). There would be a net increase in total CCC revenue and revenue per ADA. However, like all other tuition and fee proposals, it isn't clear whether these revenues would add to or replace tax funds in support of CCC's.

The allocation of new financial aids, assumed to match the increase in existing aid programs for each eligible student, results in smaller enrollment losses among those carrying a full-time academic load than among those carrying a part-time academic load. Despite the student aid, however, greatest losses still occur among the lowest income groups.

The distribution of enrollment losses by gender and racial and ethnic background are about the same in proposal (B) as in (A); i.e., the greatest proportionate losses are among females and minorities. In contrast to (A), however, proposal (B) results in relatively greater losses among those over 61 years-of-age and those with more prior education. This is due to the new financial aid program which offsets the fee increase least often for the higher income student who carries a smaller academic load.

The assumed new financial aid, $6.7 million, consumes far less than one-third of the tuition revenues. The remaining $14 million could be used for further increases in student financial aid, applied (as in Table 1) to institutional support, or allocated for some other purpose.

(C) A fee or tuition proposal of $4 per unit (over $100 per year for a full-time student) would result in a loss of students estimated at between five and eight percent of CCC enrollment, even assuming increased financial aid from existing programs. Tuition revenue would approximate $70 million, but the loss in apportionments could offset this.

Enrollment losses, as expected, are greatest among low income students. In contrast to proposals (A) and (B), enrollment losses from proposal (C) are relatively greater among dependent than among self-supporting students. This is because the per-unit charge, without any new financial aid programs, has its greatest impact upon full-time students who are dependent upon others for their financial support.

The impact of proposal (C) also is greatest among those 18 to 21 years-of-age, Hispanic, with less than Junior status. The smallest relative impact from (C) is on those over age sixty-one, white, and already possessing bachelors' degrees.

While the simulation model does not explicitly include the distribution of students by program, it is possible to infer some important implications of fee increases for college programs.

Those students intending to transfer are younger, more often full-time and, if dependent, from somewhat higher income backgrounds than those enrolled for job training. (See Chancellor's Office July, 1981 study of Transfer Students.) Students enrolled for continuing or avocational education are the oldest and carry the lightest loads. These relationships suggest that under proposal (C), the greatest proportionate enrollment losses would be among those students enrolled for transfer, next largest among vocational students, and least among those whose objectives are avocational in character. Proposal (B) has a reverse impact: the largest proportionate losses are among avocational students, followed by those enrolled for job training, and with the smallest losses among transfer students. Losses under proposal (A) of students in the three program categories would be nearly proportional.

The differential impact of the three proposals on programs is due to the use, in (C), of a unit rate as opposed to the flat fees of (A) and (B). Also contributing to the differential impact is the use of a new student financial aid program in (B).

Excluded from these estimates are the nominal fee reductions resulting from projected enrollment losses. Nor are the added costs of managing fee collections or student financial aid included in these estimates. The costs could be substantial since low-cost CCC's typically are not staffed to collect general fees or to manage sophisticated financial aid programs.

Also excluded from these calculations are the "spillover" costs that might result from reduced CCC enrollments. Such costs could be due to higher unemployment, increased public welfare payments, and, possibly, increased crime, among other factors.

Finally, the simulation model measures only the change in enrollment resulting from a change in the cost of enrollment. Enrollment changes resulting from changes in such factors as demographics, the economy, and admissions practices are excluded.

TABLE 1

COMPARISON OF THREE FEE INCREASE PROPOSALS
CALIFORNIA COMMUNITY COLLEGES
(STATEWIDE IMPACT)

	(A) $50/$30 INCREASE		(B) $60/$40 INCREASE NEW STUDENT AID		(C) $4/UNIT INCREASE	
	LOW[a]	HIGH	LOW	HIGH	LOW	HIGH
REVENUE (in $ millions)						
Tuition Revenue	$ 52.2	$ 50.9	$ 65.4	$ 63.6	$ 71.5	$ 68.4
Fee/Aid Management Cost	NA	NA	NA	NA	NA	NA
New Student Aid	0	0	- 6.7	- 6.7	0	0
Apportionment	-36.3	-58.4	-34.7	-55.8	-58.0	-98.9
Net Revenue Change	$ 15.9	$- 7.5	$ 24.0	$ 1.1	$ 13.5	$-25.5
EXISTING STUDENT AID INCREASE	$ 5.5	$ 5.5	$ 6.7	$ 6.7	$ 13.3	$ 13.3
ADA LOSS	25,360	40,804	24,617	39,526	39,696	64,216
(%)	(-3.5)	(-5.6)	(-3.4)	(-5.4)	(-5.5)	(-8.8)
$/ADA BEFORE	$1,850	$1,850	$1,850	$1,850	$1,850	$1,850
$/ADA AFTER	$1,939	$1,949	$1,951	$1,957	$1,976	$1,990
(% CHANGE)	(4.8)	(5.4)	(5.5)	(5.8)	(5.5)	(8.8)

[a] The low estimate assumes an average price elasticity of -0.5 while the high estimate assumes an average price elasticity of -0.8. Research reported in Appendix A suggests these are the "outer bounds" of price response that may be expected from community college students.

SOURCE: Appendix B.

TABLE 2

ESTIMATED ENROLLMENT LOSS FOR COMMUNITY COLLEGES STATEWIDE
FOR A $50 FULL-TIME AND $30 PART-TIME STUDENT FEE CHARGE

ITEM	BASE ENROLLMENT		ENROLLMENT LOSS AT ELASTICITY LEVEL -0.5		-0.8	
	No.	%	No.	%	No.	%
UNIT LOAD						
≥ 12	295,743	21.3	10,676	3.6	17,425	5.9
9 - 11	240,128	17.3	11,528	4.8	18,524	7.7
6 - 8	99,812	7.2	5,389	5.4	8,572	8.6
1 - 5	556,056	40.0	20,089	3.6	31,813	5.7
Noncredit	199,247	14.2	7,292	3.7	11,548	5.8
TOTAL	1,390,986	100.0	54,974	4.0	87,882	6.3
INCOME (PARENT/STUDENT)						
Dependent						
≤ $12,000	140,974	10.1	7,508	5.3	12,688	9.0
$12,000 - $29,999	222,899	16.0	6,622	3.0	11,191	5.0
$30,000 plus	112,045	8.1	2,196	2.0	3,711	3.3
Self-Supporting						
≤ $5,499	200,433	14.4	13,473	6.7	21,018	10.5
$5,500 - $10,799	590,828	42.5	22,043	3.7	34,387	5.8
$10,800 plus	123,807	8.9	3,132	2.5	4,887	4.0
TOTAL	1,390,986	100.0	54,974	4.0	87,882	6.3
GENDER						
Male	616,207	44.3	23,667	3.8	37,858	6.1
Female	774,779	55.7	31,307	4.0	50,024	6.5
TOTAL	1,390,986	100.0	54,974	4.0	87,882	6.3
AGE						
< 21	491,157	35.2	18,042	3.7	29,988	6.1
22 - 29	443,307	31.9	18,403	4.2	28,948	6.5
30 - 61	409,924	29.5	16,668	4.1	26,044	6.4
62 plus	46,598	3.4	1,861	4.0	2,902	6.2
TOTAL	1,390,986	100.0	54,974	4.0	87,882	6.3
ETHNIC ORIGIN						
Asian, American Indian, Other	117,956	8.5	5,091	4.3	8,155	6.9
Black	127,693	9.2	5,815	4.6	9,296	7.3
Hispanic	156,207	11.2	6,961	4.5	11,316	7.2
White	989,130	71.1	37,107	3.8	59,115	6.0
TOTAL	1,390,986	100.0	54,974	4.0	87,882	6.3
EDUCATION COMPLETED						
Thru Sophomore	1,107,225	79.6	44,058	4.0	70,622	6.4
Junior Plus	163,719	11.8	6,375	3.9	10,142	6.2
B.A. plus	120,042	8.6	4,541	3.8	7,118	5.9
TOTAL	1,390,986	100.0	54,974	4.0	87,882	6.3

TABLE 3

ESTIMATED ENROLLMENT LOSS FOR COMMUNITY COLLEGES STATEWIDE
FOR A $60 FULL-TIME AND $40 PART-TIME STUDENT FEE CHARGE

ITEM	BASE ENROLLMENT		ENROLLMENT LOSS AT ELASTICITY LEVEL -0.5		-0.8	
	No.	%	No.	%	No.	%
UNIT LOAD						
≥ 12	295,743	21.3	6,638	2.2	10,892	3.7
9 - 11	240,128	17.3	12,250	5.1	19,699	8.2
6 - 8	99,812	7.2	6,191	6.2	9,850	10.1
1 - 5	556,056	40.0	26,500	4.8	41,966	7.6
Noncredit	199,247	14.2	9,722	4.9	15,397	7.3
TOTAL	1,390,986	100.0	61,301	4.4	97,804	7.0
INCOME (PARENT/STUDENT)						
Dependent						
≤ $12,000	140,974	10.1	7,003	5.0	11,834	8.4
$12,000 - $22,999	222,899	16.0	7,240	3.3	12,236	5.5
$30,000 plus	112,045	8.1	2,479	2.2	4,190	3.7
Self-Supporting						
≤ $5,499	200,433	14.4	13,141	6.6	20,500	10.2
$5,500 - $10,799	590,828	42.5	27,447	4.7	42,818	7.3
$10,800 plus	123,807	8.9	3,991	3.2	6,226	5.0
TOTAL	1,390,986	100.0	61,301	4.4	97,804	7.0
GENDER						
Male	616,207	44.3	26,605	4.3	42,470	6.9
Female	774,779	55.7	34,696	4.5	55,334	7.1
TOTAL	1,390,986	100.0	61,301	4.4	97,804	7.0
AGE						
< 21	491,157	35.2	18,717	3.8	31,084	6.3
22 - 29	443,307	31.9	20,953	4.7	32,932	7.4
30 - 61	409,924	29.5	19,413	4.7	30,327	7.4
62 plus	46,598	3.4	2,218	4.8	3,461	7.4
TOTAL	1,390,986	100.0	61,301	4.4	97,804	7.0
ETHNIC ORIGIN						
Asian, American Indian, Other	117,956	8.5	5,457	4.6	8,730	7.4
Black	127,693	9.2	6,189	4.9	9,876	7.7
Hispanic	156,207	11.2	7,183	4.6	11,655	7.5
White	989,130	71.1	42,472	4.3	67,543	6.8
TOTAL	1,390,986	100.0	61,301	4.4	97,804	7.0
EDUCATION COMPLETED						
Thru Sophomore	1,107,225	79.6	48,641	4.4	77,815	7.0
Junior Plus	163,719	11.8	7,241	4.4	11,499	7.0
B.A. plus	120,042	8.6	5,419	4.5	8,490	7.1
TOTAL	1,390,986	100.00	61,301	4.4	97,804	7.0

TABLE 4

ESTIMATED ENROLLMENT LOSS FOR COMMUNITY COLLEGES STATEWIDE

FOR A $4 PER UNIT STUDENT FEE CHARGE

ITEM	BASE ENROLLMENT		ENROLLMENT LOSS AT ELASTICITY LEVEL -0.5		-0.8	
	No.	%	No.	%	No.	%
UNIT LOAD						
≥12	295,743	21.3	25,480	8.6	41,586	14.1
9 - 11	240,128	17.3	15,324	6.4	24,637	10.3
6 - 8	99,812	7.2	5,750	5.8	9,149	9.2
1 - 5	556,056	40.0	15,648	2.8	24,778	4.5
Noncredit	199,247	14.2	5,833	2.9	9,238	4.6
TOTAL	1,390,986	100.0	68,035	4.9	109,388	7.9
INCOME (PARENT/STUDENT)						
Dependent						
≤ $12,000	140,974	10.1	12,081	8.6	20,417	14.1
$12,000 - $29,999	222,899	16.0	9,812	4.4	16,583	7.4
$30,000 plus	112,045	8.1	3,134	2.8	5,296	4.7
Self-Supporting						
≤ $5,499	200,433	14.4	16,873	8.4	26,322	13.1
$5,500 - $10,799	590,828	42.5	22,872	3.9	35,681	6.0
$10,800 plus	123,807	8.9	3,263	2.6	5,089	4.1
TOTAL	1,390,986	100.0	68,035	4.9	109,388	7.9
GENDER						
Male	616,207	44.3	29,184	4.7	46,960	7.6
Female	774,779	55.7	38,851	5.0	62,428	8.1
TOTAL	1,390,986	100.0	68,035	4.9	109,388	7.9
AGE						
< 21	491,157	35.2	26,234	5.3	43,747	8.9
22 - 29	443,307	31.9	21,266	4.8	33,542	7.6
30 - 61	409,924	29.5	18,512	4.5	28,944	7.1
62 plus	46,598	3.4	2,023	4.3	3,158	6.8
TOTAL	1,390,986	100.0	68,035	4.9	109,388	7.9
ETHNIC ORIGIN						
Asian, American Indian, Other	117,956	8.5	6,515	5.5	10,490	8.9
Black	127,693	9.2	7,435	5.8	11,950	9.4
Hispanic	156,207	11.2	9,540	6.1	15,600	9.9
White	989,130	71.1	44,545	4.5	71,348	7.2
TOTAL	1,390,986	100.0	68,035	4.9	109,388	7.9
EDUCATION COMPLETED						
Thru Sophomore	1,107,225	79.6	55,372	5.0	89,280	8.1
Junior	163,719	11.8	7,668	4.7	12,264	7.5
B.A. plus	120,042	8.6	4,995	4.2	7,844	6.5
TOTAL	1,390,986	100.0	68,035	4.9	109,388	7.9

Analytical Studies Unit
Chancellor's Office
California Community Colleges
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APPENDIX A

PRICE ELASTICITY OF DEMAND FOR COMMUNITY COLLEGE ENROLLMENT

SUMMARY

Recent tax reforms have resulted in the search by state and local public policy-makers for other sources of revenues (such as tuition) to support public two-year colleges. Policies to increase tuition and fees have both allocative and distributional implications. Little is known, however, about the price elasticity of enrollment demand on the part of potential two-year college students. This paper fills that gap by examining new data and comparing results with existing literature on demand for postsecondary education (PSE).

First, 15 multiple regressions were run on objective data for enrollment, price, income, and ability specified in state-level aggregations for public two-year colleges during 1975-76 and 1979-80. All runs are statistically significant at the 1% level and price (tuition, fees, and transportation) elasticities range from -0.5 to -0.8. That is, a ten percent increase in the price or cost of enrollment results in a five to eight percent decrease in enrollment.

Second, a probability sample of California adults who were attending or planning to attend a two-year community college in 1979 were asked what they would do if tuition were charged at various levels. The high resulting tuition, fee and transportation elasticity (-0.84) is explained in part by the fact that most of the respondents are economically self-supporting. Individuals with higher incomes and more prior education are characterized by lower elasticities.

Third, students enrolled in a sample of California public two-year (community) colleges during 1978 were asked a set of similar "what if" tuition questions. While consumer attitude surveys are questionable at best, the overall result here: a tuition, fee and transportation elasticity of -0.57, falls within the range of objective national data, a more restrained response than might have been expected. The demand of low income, self-supporting students was found to be significantly more price-elastic than that of students dependent upon high levels of family or other-than-self support.

Other studies of younger, four-year students suggest an overall tuition and fee-elasticity of -0.3 (a tuition, fee and transportation elasticity of less than -0.4). Demand is less price-elastic among individuals with high incomes and high academic ability. A rare study of individuals over 25 years-of-age and married found tuition elasticities of -0.44 for males and -0.58 for females.

Evidence in this paper strongly suggests that the price elasticity of demand for community colleges is higher than that for the four-year colleges and universities. The main reasons for this difference are the characteristics of two-year college students who more often are self-supporting and low income, and who possess less academic preparation than do their counterparts at the four-year institutions.

ENROLLMENT DEMAND

Other things being equal, individuals demand Q_{ij} units of the ith kind of instruction in the jth institution at the point where their demand or marginal benefits (MB_{ij}) equal their price or total cost (P_{ij}). (This cost includes tuition, fees, books, supplies, transportation, and foregone earnings; i.e., expenses that individuals incur only because they are students.)

The relationship between price and quantity of college demanded, therefore, can be described by the following functional form:

$$P_{ij} = a_{ij} - b_{ij}Q_{ij}$$

where, a_{ij} and b_{ij} are constants specifying the value (marginal benefits) attributable to one unit Q_{ij} of college.

And, enrollment demand can be written as

$$Q_{ij} = \frac{a_{ij} - P_{ij}}{b_{ij}}$$

The position and slope of a demand curve can be best described by the "price elasticity" of demand: the percentage of change in demand (in this case college enrollment in the ith kind of instruction in the jth institution) which results from a one percent change in the price or cost of enrollment at the same institution.

$$e_{ij} = \frac{100\left(\frac{\Delta Q_{ij}}{Q_{ij}}\right)}{100\left(\frac{\Delta P_{ij}}{P_{ij}}\right)}$$

Thus, the change in enrollment demand, ΔQ_{ij}, from a proposed change in price ΔP_{ij} can be estimated if the relevant price elasticity, e_{ij}, is known.

$$\Delta Q_{ij} = \frac{e_{ij}\ (\Delta P^c_{ij})\ Q_{ij}}{P^c_{ij}}$$

This formulation ignores two basic facts. First, individuals must decide not only whether to consume (enroll in) college, but also in which of several suppliers j = 1,.. n for the same kind of instruction, i, selected. Therefore, it is the relative price that is important. This measures the relationship of the price of enrollment at institution j to the prices of other institutions that offer instruction that is a close substitute to that offered at j.

The notion of relative price can be described in terms of "cross-price elasticity." This is defined as the percentage change (normally increase) in the ith kind of enrollment at institution j which results from a one percent increase in the price of the ith kind of instruction at a similar institution that offers a close substitute.

There is a second complication. The earlier assumption that other things are equal does not hold. Preferences of individuals and groups of individuals are not the same nor is any set of individuals in precisely the same circumstances. Consequently, to examine the effect of price on enrollment, one must attempt to hold constant the affect upon enrollment of other relevant factors. This suggests the following demand function:

$$Q_{ij}^{k} = f(\hat{P}_{ij}, Y^{k}, A^{k}, S^{k}, E^{k})$$

where,

Q_{ij}^{k} = is the demand by the kth individual for enrollment in the ith kind of instruction at the jth institution,

$\hat{P}_{ij}$ = the relative price or cost for the kth individual to enroll in the ith kind of instruction at the jth institution,

Y^{k} = income available to the kth individual to support PSE costs,

A^{k} = academic ability of the kth individual,

S^{k} = sociocultural status of the kth individual, and

E^{k} = the educational levels of kth's family and peers;

where,

$f_{\hat{P}_{ij}} \langle o, f_{Y^{k}} \rangle o, f_{A^{k}} \rangle o, f_{E^{k}} \rangle o$, and that sign if $f_{S^{k}}$ depends upon how the variable is specified.

Typically, the higher the income, ability, and education of parents and peers, the greater the demand for PSE, when other factors are constant. When price is increased, other factors unchanged, it is expected that demand will decrease (a downward sloping demand curve). The impact of sociocultural factors depend upon their character and measurement.

Now to proceed with the relevant questions. Do price elasticities differ for different kinds of instruction or types of institutions? Do price elasticities differ with regard to other factors in the demand function for differently situated individuals?

EVIDENCE

Empirical evidence on these questions can be derived from about a dozen serious studies conducted during the past 15 years. McPherson (1968), Jackson and Weathersby (1975), and Hyde (1977) have produced excellent reviews of most such studies. All these studies examine the relationship between enrollment and price or cost, along with varying forms of one or more of the other relevant non-price factors noted above.

The earliest efforts examined actual enrollment choices by looking at aggregate cross-section or time series data within a state and across all states. Subsequent efforts looked at data on the actual college-going choices of specific individuals, relying on multiple regression formulations. A few studies have examined what students (the consumers) say they would do if prices were increased or decreased. Two major studies, Miller and Radner (1975) and Kohn et.al. (1972), also use data on individuals but rely on conditional logit analysis to allow for actual choices among alternative possible PSE institutions as well as the choice of whether or not to attend <u>any</u> institution.

All these efforts have certain drawbacks. Studies using aggregate data typically encounter difficulty accounting for non-price factors. Problems with the consumer survey method are well known. The conditional logit examinations of individual choice are extremely complex. While internally rigorous, the simplifying assumptions required and lack of needed data raise questions about the validity of findings in the conditional logit studies.

Nearly all studies deal exclusively with 18 to 24 year-olds. Most studies examine the choice of attendance at a four-year college or university. Few of the studies analyze the impact of costs other than tuition such as transportation, books, supplies, and foregone earnings. Nor is the impact of financial aid grants, as a "price-adjuster," analyzed to any significant extent in the existing literature. In an effort to address these gaps, this study analyzes new data on the demand for two-year or "community" colleges. Results are then compared to findings from other studies.

Considerable care must be taken when comparing results for price elasticities from different studies. Aside from the usual questions of study methodologies and sampling, price elasticities may vary simply because different base prices have been used. Price response coefficients, generally expressed in terms of the percent change in enrollment for each $100 change in price, likewise must be interpreted with the base price in mind. Also of concern is the extent to which non-price factors are held constant. Conclusions in this area are, at best, approximate and need to be veiwed cautiously.

COMMUNITY COLLEGES DATA

National Survey

This analysis incorporates enrollment, tuition, fees, and other relevant data specified in state-level aggregations for two-year community colleges during 1975-76 and 1979-80.

The basic model uses states' two-year community college enrollments or enrollment rates as the dependent variable. Independent variables include price, specified variously for tuition, fees, transportation, and foregone earnings. Several regressions adjust price for the impact of financial aid grants. Other independent variables include income (per capita for a state), ability (proportion of high school graduates within a state's adult population), and state adult population, in some cases. Some equations are fit to arithmetic values and other equations to log values of the variables.

Results of 15 regressions are reported in Table 1. In all cases, the equation provides an overall goodness of fit that is significant at the one percent level. Positive autocorrelation is found (using the Durbin-Watson test on data in which the dependent variable is sequenced from low to high values) in three of the four regressions of 1979-80 data. Thus, it is possible that one or more important independent variables appear to have been omitted. This does not detract from the validity of the findings, however.

In 14 of 15 regressions, the coefficient for price is negative (and statistically significant in 13). Consistent with existing literature, community colleges can be characterized by a downward sloping demand curve (negative price elasticity).

In summary, the statistically significant price elasticities for different definitions of price are found to range as follows:

a.	tuition/fees plus transportation less financial aid grants	-0.45 to -0.61
b.	tuition/fees plus transportation	-0.56 to -0.79
c.	tuition/fees plus transportation plus foregong earnings	-1.20 to -1.74

Reducing price by financial aid grants does not result in a better fit between enrollment and price. This is due in part to difficulties encountered in specifying the aid variable, particularly for small states in 1975-76. Because of these faulty aid specifications, efforts to isolate and measure the relationship of financial aid to enrollment demand were unsuccessful. Indeed, aid per student is negatively correlated with enrollment in the small states; i.e., the greater the aid, the lower the enrollment.

Efforts to specify community college prices relative to those of close substitutes also proved to be unsuccessful. This is because price data are not available for proprietary schools, a major substitute for community colleges. Also, the impact of non-price factors such as location and admissions policies for close substitutes could not be held constant.

Foregone earnings, as expected, raise the price elasticity value. Their inclusion does not provide as good a fit as when using only direct costs, however. This is due apparently to the high correlation between foregone earnings and per capita income.

As expected, regression coefficients for per capita income are positive in all but three regressions. Thus, other things being equal, the higher the income, the higher the college enrollment. Significant positive income elasticities range between 1.6 and 2.8. However, income is significant as an explanatory variable only in 1975-76 and then primarily for small states. These results are not surprising in light of findings from other studies. A higher and more consistent correlation between income and four-year public and private enrollment is typical. Two-year community colleges enroll low income students to a much greater extent. Consequently, isolating community colleges dilutes the income-enrollment relationship in such aggregate data.

Aggregate statewide statistics measuring student ability are not available. This analysis uses each state's ratio of high school graduates to adult population, actually a measure of prior education, to act as a proxy for ability. This variable has a significant impact on enrollment rates in 1979-80 and for large states (but not small states) in 1975-76.

TABLE 1

REGRESSIONS OF NATIONAL DATA
FOR COMMUNITY COLLEGES
1979-80, 1975-76

ENROLL/MEASURES	R^2	(Y)	(A)	(1) FEE + TRANS. LESS AID	(2) FEE + TRANS. OR FEE ONLY*	(3) FEE + TRANS. + OPP. COST	(4) FIN. AID	POP.	df	DW
1979-80										
1. RATE/ARITH.	.372 (9.06)[a]	0.193×10^{-3} (0.51) $e = 0.62$	0.684×10^{-3} (3.60)[b]	$-.358 \times 10^{-2}$ (13.71)[a] $e = -0.61$					3, 46	0.641[a]
2. TOTAL/LOG	.848 (62.75)[a]	1.31 (1.87)	0.89 (0.64)	-0.49 (10.37)[a]				1.11 (132.70)[a]	3, 46	0.825[a]
3. RATE/LOG	.638 (15.53)[a]	-0.984×10^{-1} (0.02)	0.127×10^{-1} (4.45)[a]		-0.596×10^{-2} (13.58)[a]		-0.38×10^{-3} (1.54)	0.375×10^{-1} (0.23)	5, 44	1.276[a]
4. RATE/ARITH.	.483 (10.53)[a]	0.991 (1.20)	0.994×10^{-2} (1.97)	-0.773×10^{-3} (17.39)[a]				0.998×10^{-1} (1.98)	5, 44	0.997[a]
1975-76										
5. TOTAL/LOG	.872 (76.53)[a]	1.600 (5.75)[b]	-0.427 (0.41)		-0.743 (23.61)[a]			1.135 (211.22)[a]	4, 45	
6. TOTAL/LOG	.830 (55.09)[a]	2.819 (11.78)[a]	0.221 (0.09)			-1.744 (6.85)[b]		1.153 (164.67)[a]	4, 45	
7. TOTAL/LOG	.807 (46.98)[a]	1.960 (5.77)[b]	0.417 (0.262)	0.068 (0.51)				1.129 (132.33)[a]	4, 45	
8. RATE/ARITH.	.368 (8.94)[a]	-0.869×10^{-3} (10.75)[a]	-0.298×10^{-2} (0.010)	-0.295×10^{-2} (6.93)[b] $e = -0.$					3, 46	
9. RATE/ARITH.	.320 (7.23)[a]	$0.10[illegible] \times 10^{-2}$ (11.5[illegible])[a]	0.225×10^{-1} (0.59)			-0.117×10^{-2} (3.21)[b] $e = -1.20$				
10. TOTAL/LOGS (LARGE STATES)	.802 (11.17)[a]	0.138 (0.01)[a]	0.880 (0.53)		-0.787 (13.44)[a]			0.958 (27.296)[a]	4, 11	
11. TOTAL/LOGS (SMALL STATES)	.705 (17.32)[a]	1.981 (5.65)[a]	-0.671 (0.68)		-0.562 (6.30)[a]			1.094 (54.58)[a]	4, 29	
12. TOTAL/LOGS (LARGE STATES)	.772 (9.31)[a]	0.022 (0.000)	1.062 (0.68)	-0.654 (10.18)[a]				1.044 (27.04)[a]	4, 11	
13. TOTAL/LOGS (SMALL STATES)	.699 16.84)[a]	2.036 (5.89)[a]	-0.114 (0.02)	+0.227 (5.61)[a]				0.878 (30.70)[a]	4, 29	

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ENROLL/MEASURES	R^2	(Y)	(A)	(1) FEE + TRANS. LESS AID	(2) FEE + TRANS. OR FEE ONLY*	(3) FEE + TRANS. + OPP. COST	(4) FIN. AID	POP.	df	DW
14. RATE/ARITH. (LARGE STATES)	.733 (11.01)[a]	-0.129×10^{-3} (0.043)	0.134 (5.35)[b]	-0.833×10^{-2} (15.035)[a] $e=-0.76$					3,12	
15. RATE/ARITH. (SMALL STATES)	.452 (8.28)[a]	0.892×10^{-3} (15.25)[a]	-0.786×10^{-2} (0.09)	-0.838×10^{-3} (0.78) $e < -.10$					3, 30	

NOTES:

R^2 = coefficient of determination
Y = income per capita
A = ratio high school graduates of adult population

PRICES:

FEE = tuition and fees per student; *tuition and fees only
TRANS = transportation costs per student
AID = financial aid grants per students
OPP COST = foregone earnings
POP = adult population
df = degrees of freedom
DW = Durbin-Watson statistic
ENROLL = enrollment specifications
RATE = ratio of enrollment to adult population
TOTAL = total enrollment
MEASURE = values of variables
LOGS = variables specified in logarithmic values
ARITH = variables specified in arithmetic values

FIGURES IN PARENTHESES ARE F-RATIOS; OTHER FIGURES ARE REGRESSION COEFFICIENTS

a = statistically significant at the 1% level
b = statistically significant at the 5% level
e = price elasticity

Analyses for this table are performed using the multiple regression procedure in the Statistical Package for the Social Sciences (SPSS).

SOURCES:

U. S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States (for 1976 and 1980)

American Association of Community and Junior Colleges Community, Junior and Technical College Directory (for 1975 and 1979)

National Institute of Independent Colleges and Universities, Federal Student Assistance and Categorical Programs (1979)

Chancellor's Office
California Community Colleges
Analytical Studies Unit
October, 1981

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California Field Survey

In this survey, a probability sample of California adults who were attending or planning to attend a community college in 1979 were asked what they would do if tuition were set at successive $10 levels per course. There are many problems with direct surveys of consumers or potential consumers about what they would do in the event of a price change. It is difficult to know if respondents are being honest, particularly if they sense their response may have some impact on policy. Even if respondents try to answer honestly, there is no assurance that they would behave according to even their own expectations when confronted with actual charges.

In spite of these problems, results of this survey are similar, in many respects to other surveys. (See Table 2.) The overall fee-plus-transportation elasticity of -0.84 is on the high end of the range of like elasticities found in the objective National Survey Data reviewed above. Aside from differences in survey technique, this result may be due to the Field data being confined to California. The response to a fee increase in a state like California, where community college fees have been virtually nonexistant, is likely to be higher than would be true for an average response across the country. The psychological differences would seem to be substantial.

Like virtually every other study, Field results demonstrate a much higher price elasticity for low-income than for high-income individuals. The higher elasticity for females than for males is remarkably similar to findings of Bishop and Van Dyk (1977) which are described below. Findings relative to demand and age also are consistent with findings of other studies. Individuals in the traditional age cohort of 18 to 24 years display much lower elasticities than those over fifty. The pattern for ages 25 to 50 years-of-age is less certain, however.

TABLE 2

RESPONSE TO PROPOSED CHANGE IN
TUITION AND FEES
CALIFORNIA COMMUNITY COLLEGES, 1979

	n	PRICE RESPONSE[a]	PRICE ELASTICITY[b]
TOTAL	1,080	17.9	-0.84
Previously Enrolled	453	14.8	-0.69
Now Enrolled	257	18.9	-0.88
Never Enrolled	277	18.6	-0.87
$10 per course	1.080	10.2	-0.60
$20 per course	1,080	24.4	-0.71
$30 per course	1,080	47.4	-0.92
$40 per course	1,080	59.2	-0.86
INCOME			
< $7,500	114	25.2	-1.18
$7,000 - $9,999	96	19.4	-0.91
$10,000 - $14,999	161	21.9	-1.02
$15,000 - $24,999	305	16.8	-0.78
> $25,000	246	11.3	-0.53
Male	504	15.4	-0.72
Female	576	20.4	-0.95
AGE			
18 - 20	194	16.9	-0.79
21 - 24	162	16.5	-0.77
25 - 29	185	18.8	-0.88
30 - 34	172	17.7	-0.82
35 - 39	125	16.2	-0.76
40 - 49	128	17.4	-0.82
50 - 64	91	21.1	-0.99
> 65	21	23.4	-1.09
EDUCATION			
Less than high school	97	21.3	-0.99
High school completed	347	18.6	-0.88
1, 2 years of trade or business school	45	21.1	-0.98
1 - 3 years of college	389	17.2	-0.80
College completed	200	16.1	-0.75

NOTES:

[a] Average percent decrease for each $100 increase in tuition, unless otherwise noted. Full-time students are assumed to take 8 courses per year.

[b] Tuition, fee, and transportation elasticity , using a 1979 price of $467 for a full-time student. If direct costs are defined to include books and supplies as well as fees and transportation ($709 in 1979), direct cost elasticity is -1.27.

SOURCE: Field Research Corporation, A Survey of California Public Attitudes Toward California Community Colleges, San Francisco, 1979.

Individuals with prior education in a community or other college are characterized by significantly lower price elasticities than those who have not attended college. Consistent with this finding, the average price elasticity for individuals previously enrolled (and who have, presumably, more prior education) is significantly less than the elasticities for individuals now enrolled or never enrolled (and who, presumably, have less prior education).

Reactions to successively higher levels of possible tuition are not linear. Elasticities peak at $30 fee increases per course and are disproportionately larger than elasticities at $10 or $20 per course. The elasticity at a $40 per course is slightly less than at $30 per course.

California Student Resources Survey

A further look at demand for community colleges is possible by examining yet another consumer survey: the Student Resources Survey (SRS) conducted by the College Entrance Examination Board. In this survey, students enrolled during 1978 in a sample of California Community Colleges were questioned about what they would do if tuition were levied at $4, $8, and $16 per unit (no tuition was charged at the time).

Responses were specified such that it is possible to estimate the resulting decline in units taken as well as an anticipated withdrawal from college. Thus, the resulting overall price elasticity of demand, -0.57, is in terms of full-time equivalent students, rather than enrollment (see Table 3). (The elasticity of enrollment demand is slightly lower at -0.52.)

The overall price elasticity (-0.57) falls toward the lower bound of results from the National Data. The reason for this isn't totally clear. A higher elasticity would be expected, due to the survey methodology used. While the sample is somewhat overloaded with full-time students, their response to a given level of price increase is not found (in this study) to be different than that of part-time students.

TABLE 3

RESPONSE TO PROPOSED CHANGE IN
TUITION AND FEES
CALIFORNIA COMMUNITY COLLEGES
1978

	NUMBER	PRICE RESPONSE[a]	PRICE ELASTICITY[b]
TOTAL	1,073	13.5	-0.57
$4 per unit	1,073	8.0	-0.78
$8 per unit	1,073	13.3	-0.65
$16 per unit	1,073	19.2	-0.47
MARITAL STATUS			
Married	393	14.4	-0.61
Never	562	12.9	-0.54
Div./Sep./Widow	114	13.9	-0.59
AGE			
18 - 21	435	12.3	-0.52
22 - 24	116	16.2	-0.68
25 - 29	141	15.3	-0.64
30	375	13.6	-0.57
GENDER			
Male	474	14.8	-0.63
Female	599	12.0	-0.50
LOAD			
$< 1/2$	395	13.1	-0.55
1/2 - 3/4	274	13.7	-0.58
$\geq 3/4$	392	13.4	-0.57

TABLE 3 (Cont'd.)

	NUMBER	PRICE RESPONSE[a]	PRICE ELASTICITY[b]
FINANCIAL STATUS			
INDEPENDENT	337	14.7	-0.62
$0 - 2,999	93	14.2	-0.60
$3,000 - 5,999	56	16.1	-0.68
$6,000 - 11,999	80	13.5	-0.57
$12,000	108	14.9	-0.63
DEPENDENT	298	12.1	-0.51
$0 - 5,999	26	10.5	-0.44
$6,000 - 11,999	49	12.3	-0.52
$12,000 - 24,000	136	13.3	-0.56
$24,000	87	11.2	-0.47

NOTES:

[a]Average percent decrease in full-time equivalent enrollment. If total headcount enrollment is used, the overall rate is, as expected, lower at 12.4% with a lower elasticity of -0.52.

[b]Tuition, fee and transportation elasticity. These costs averaged $421 per full-time student in 1978. If other direct costs (such as books and supplies are added for an average "direct cost" of $640 per full-time student in 1978, the direct cost elasticity is higher at -0.80.

SOURCES:

Student Resource Survey (SRS) of California Community College students in October 1978 conducted jointly by the colleges and the College Entrance Examination Board.

Student Economics and Resources Survey (SEARS) of California Community College students in January 1980 conducted by the colleges and the College Entrance Examination Board.

The low price elasticity of the SRS study, in contrast to the Field Survey, can be explained primarily by the age, financial status, and prior education of the respondents. Those responding to the Field Survey are older, more likely to be financially independent or self-supporting, and more highly educated than those in the SRS survey. Another, partial explanation of the results may be that a number of students who take both credit and noncredit courses, felt the latter would escape the change, underestimated the impact of the tuition increase, and, therefore, underestimated their response. This would result in a lower-than-normal price elasticity. Finally, what students say they will do (as in this survey) may differ from what they actually do in the event of a price change.

In any case, married, independent, male students within this student sample respond more dramatically to a given price increase than do those who are dependent, female and who have never married. This 1978 California study marks the first time dependent and independent students have been reported separately. Elsewhere, results suggest that older, part-time female students are more responsive to price changes than are younger, full-time males. SRS results suggest that, for community colleges, the important condition may be financial status: whether a student is financially dependent or independent. Other variables such as age, sex and academic course load may be important primarily because of their high (or low) correlation with financial status.

In contrast to the Field Survey, the relationship between tuition increases and enrollment decreases is linear and declining. Elasticities in the Field Survey increased with increased charges and then declined at the highest charge.

OTHER STUDIES

Variation is the dominant single feature of existing findings on the topic of college enrollment demand. McPherson (1978) builds on the earlier work of

Jackson and Weathersby (1975) to derive a series of price-response coefficients (percentage-point changes in the rate of enrollment for each $100 change in price), in 1974 dollars, which range from 0.05 to 1.53. Concluding that the typical response is a one percentage point change in enrollment rates (per $100 change in price), McPherson suggests that (tuition) price elasticity is about -0.3. This assumes a college-going rate of one-third among 18 to 24 year-olds and a base price of $1,000. Adding the average 1974 transportation cost, the tuition, fee and transportation price elasticity would be nearly -0.4.

A series of relatively low price-response coefficients are derived in a staff report for the National Commission on Financing Postsecondary Education (NCF, 1974). These coefficients are derived from the Miller-Radner (1974) research on 1966 high school seniors who went on to college or elsewhere in 1967. Resulting comparative price elasticities, using 1972-73 prices, are displayed in Table 4.

Two points emerge. First, the demand of individuals with lower incomes is more price elastic than those with higher incomes. This is consistent with findings of virtually all other studies. Second, demand is more price elastic for higher cost, more selective institutions.

Similar results are derived by Corrazzini et.al. (1972) using the national Project Talent data for 1960 tenth-grade students who may have attended college in 1963. The resulting tuition elasticities (See Table 5) also are relatively low, but show a greater difference between two-year and four-year colleges, and greater similarities between private and public four-year universities than do the Miller and Radner (1974) and NCF (1974) estimates.

These generally low elasticities may be contrasted with those estimated by Bishop and Van Dyk (1977). This study examined the college-going rates of individuals over 25 years-of-age and married. Tuition-elasticities of demand for public and private colleges were found to be -0.44 for males and -0.58 for females. These relatively high elasticities are consistent with findings from community college data described above.

TABLE 4

COMPARATIVE PRICE-ELASTICITIES[a]
OF DEMAND FOR POSTSECONDARY EDUCATION
FOR RECENT HIGH SCHOOL SENIORS
BY INCOME CATEGORY

INSTITUTIONAL TYPE	INCOME CATEGORY		
	LOW	MID	HIGH
Public Two-Year	-0.30	-0.13	-0.08
Public Four-Year	-0.38	-0.15	-0.09
Private Two-Year	-0.55	-0.22	-0.13
Private Four-Year	-0.72	-0.28	-0.16
Noncollegiate	-0.46	-0.18	-0.11

[a] Direct cost elasticities; where direct costs for 1972-73 include tuition, fees, transportation, books, supplies and other incidental out-of-pocket outlays, but exclude room and board.

SOURCE:

Derived from National Commission on the Financing of Postsecondary Education. A Framework for Analyzing Postsecondary Education Financing Policies, a Star Report. Washington, D.C.: U.S. Government Printing Office, May 1974, Table 13, pp. 54, 55; also College Scholarship Service, Student Expenses at Postsecondary Institutions 1973-74. College Entrance Examination Board: New York, 1973.

TABLE 5

PRICE-ELASTICITIES
NATIONAL PROJECT TALENT DATA
1960, 1963

	TUITION ELASTICITIES		
	MALE	FEMALE	TOTAL
Junior Colleges	-0.096	-0.081	-0.09
Public Four-Year Univ.	-0.27	-0.10	-0.18
Private Four-Year Univ.	-0.12	NS	-0.19

SOURCES:

A. Corrazzini, D. Dugan, H. Grabowski, "Determinants and Distributional Aspects of Enrollment in U.S. Higher Education," The Journal of Human Resources, VII, 1, 1972.

Roy Radner and L. S. Miller, Demand and Supply in U.S. Higher Education New York: McGraw Hill, 1975.

Higher price elasticities are estimated by Hoenack and Weiler (1973) for Minnesota High School graduates enrolling at the University of Minnesota between 1948 and 1973. The relatively high average price elasticity of -1.31 appears to be due, in part, to the use of a price which includes tuition, fees, room and board. Earlier, Hoenack (1967) found an average fee plus transportation-elasticity of -0.85 for 1964 California High School seniors considering university enrollment.

Several studies measure price net of financial aid. However, only three major studies examine the separate effect of financial aid on enrollment decisions. Weathersby (1975) estimates that a $100 increase in state grants will increase enrollment by 0.6 percentage points. Carlson (1975) estimates that enrollment increases ranging from less than one percentage point (low income students) to less than 0.1 percentage point (middle income students) result from a $100 increase in federal grants. These and similar findings by Jackson (1977) suggest a financial aid elasticity (between +0.1 and +0.2) that is significantly less than tuition, fee, and other cost elasticities.

TYPE OF INSTITUTION

Review of the evidence from separate studies suggests that the price elasticity of demand for four-year institutions is less than for two-year institutions. The many studies of four-year choices produce elasticities that range around -0.3. Studies about prices and choices for two-year colleges produce higher price elasticities.

The reason for this difference has to do with the characteristics of those individuals who typically consider and attend two-year as opposed to four-year colleges. The former more often are independent or economically self-supporting, married, low income, lower ability, and have received less prior formal education than their counterparts at four-year institutions. All these characteristics of the potential two-year college student are associated with higher-than-average price elasticities.

Examining more homogeneous groups of individuals is difficult. The study by staff of the National Commission on Financing Postsecondary Education (NCF 1974) provides some direct evidence of the demand by similar individuals (recent high school graduates) for different types of institutions in 1967. (See Table 4.) Here, price elasticities for four-year institutions exceed those for two-year and those for private exceed those for public institutions.

These results suggest that for given student income and ability levels, the demand for higher cost, more selective institutions is more price-elastic than it is for lower-cost, generally less-selective institutions. Miller and Radner (1975) also find higher price elasticities in the more selective public institutions that are within commuting distance. Price elasticities for state universities exceed those for state colleges which, in turn, exceed those for public community colleges. The evidence regarding selectivity is not conclusive, however, when one considers the residential public and private institutions.

INDIVIDUAL CHARACTERISTICS

All studies indicate that the price elasticity of demand for low-income students is substantially higher than that for high-income students. Early work by Hoenack reporting an average elasticity of -0.85, also reported a range of elasticities of -0.71 for the lowest income bracket to -1.12 for the highest. NCF (1974) figures, derived from Radner-Miller studies, show even more variation. Data for community colleges confirm these differences. In general, elasticities for high-income students are two-thirds those reported for middle-income students. Elasticities for low-income students are two-to-three times greater than elasticities reported for middle-income students.

Ability also is a significant determinant of enrollment choice. Both Corrazzini et.al. (1972) and Miller and Radner (1975) studies demonstrate the impact of individuals' abilities on the demand for postsecondary education. In nearly

all Corrazzini regressions, ability is the most significant determinant of demand for higher education. Using SAT scores as a measure, Radner and Miller (1975) estimate that price elasticities for students with SAT scores of 375 are three-to-four times higher than elasticities of students with SAT scores of 650. Aggregate data for community colleges show a significant positive relationship between the rate of community college enrollment and ability as measured by the percent of high school graduates within the same population. Also, elasticities are found to be lower among individuals with more prior education.

Evidence on the impact of demographics on college-going is not extensive. Bishop and Van Dyk (1977) found tuition elasticities of -0.44 for males and -0.58 for females, who are married and over 25 years old. These coefficients exceed those generally found for the 18 to 24 year-old cohort in virtually all other studies. Data for community colleges support the notion of higher price elasticities for the older, independent, and married student; but are ambiguous with respect to the impact of gender.

Analytical Studies Unit
Chancellor's Office
California Community Colleges
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APPENDIX B

ENROLLMENT/PRICE SIMULATION MODEL
CALIFORNIA COMMUNITY COLLEGES

This appendix describes the model developed by Chancellor's Office staff to simulate the consequences of various possible fee or tuition proposals. Included are a description of the model's structure, the basic data specifications, and a copy of the model's program using the Statistical Analysis System (SAS).

STRUCTURE OF THE MODEL

If tuition is charged, or fees increased, enrollments decline and there are at least two impacts on community college revenues:

(1) Added receipts from the charge to those who decide to enroll in spite of the added costs, and

(2) Reduced public support due to those who decide not to enroll due to the added cost.

Thus, $$\sum_{i=1}^{9}\sum_{j=1}^{6} \Delta R_{ij} = \sum_i \sum_j \left[(E_{ij} + \Delta E_{ij})\ \Delta T_{ij}\right] + \sum_i \sum_j \left[\Delta E_{ij}\ S_{ij}\right]$$

where,

ΔR_{ij} = the total change in community college systemwide revenues resulting from a change in tuition and/or fee charge (ΔT) to the ith kind of student (i.e., full-time, part-time at CCC, CSU or UC) with jth dependency and income characteristics (i.e., low, medium and high income student with dependent or independent status for purposes of financial aid);

E_{ij} = headcount enrollment of ith kind of student with jth characteristics;

ΔE_{ij} = change in headcount enrollment resulting from a change in tuition levy for ith kind of students with jth characteristics;

S_{ij} = general fund support rate to the institution for enrollment of the ith kind of student with jth characteristics; and

ΔT_{ij} = change in tuition or fees for the ith kind of student with the jth characteristics.

Where,

i = 1 for CCC enrollments with 12 or more unit load
2 9 - 11 unit load
3 6 - 8 unit load
4 6 or less unit load
5 in noncredit classes
6 CSU enrollments with full-time load
7 part-time load
8 UC enrollments with full-time load
9 part-time load

and j = 1 for independent student with family income of less than $12,000
2 $12,000 - $29,999
3 $30,000 or more
4 independent enrollment with family income of less than $5,400
5 $5,500 - $10,799
6 $10,800 or more

For the purpose of simplicity, the following discussion omits the subscript notations dealing with kinds of students.

In summary, the model simulates the effects of changes in tuition and fee policies on the basis of student dependency status (dependent on parent for support or self-supporting), income level (three levels for each dependency status), unit credit loads (five levels, including noncredit) and financial aid, computed as an offset to the fee charge. The model further distributes the total enrollment impact by the categories of age, gender, racial and ethnic background, and prior education completed.

The model is programmed to accommodate the most relevant kinds of students and income levels. A variety of sources are used to specify estimates for model parameters that vary from one student group to another. This improves the precision of the model's aggregate estimates and, perhaps more importantly, facilitates analysis of specific kinds of individual reactions to various tuition and fee policies.

The model can be applied at the statewide, regional, district or institutional level. For purposes of this analysis, only statewide parameters are used.

The revenue "take" from tuition depends not only on the level of the charge, but also on the resulting decline in enrollment. The latter, in turn, depends upon the actual change in costs facing students.

An increase in tuition and fees, ΔT, will be offset to some extent by financial aid so that the price or cost change ΔP facing students is:

$$\Delta P = \Delta T - (\Delta F_S + \Delta F_F)$$

ΔT = Change in tuition and fees.

ΔF = Change in state financial aid, including Cal Grants A and B plus any new aid programs, and

ΔF_F = Change in federal aid, including Pell Grants, SEOG's and other cost-based aid.

Community college enrollment is a function of price or cost (relative to reasonable substitutes), students' income, and a host of other factors such as personal confidence and ability, peer and parental influence, possession of information about college opportunities, and the like. Concentrating just on a change in community college cost:

$$\Delta E = \frac{e(\Delta P)\ E}{P}$$

where,

ΔE = the change in community college enrollment,

e = the price elasticity of community college enrollment demand,

ΔP = as above, the price change facing students,

P = the prior price facing students, and

E = the prior enrollment.

The above equation is derived from the standard definition for e, the price elasticity of demand: the percentage change in demand (in this case community college enrollment) which results from a one percent change in the price or cost of enrollment:

$$e = \frac{100\left(\frac{\Delta E}{E}\right)}{100\left(\frac{\Delta P}{P}\right)}$$

Added community college revenues ΔTR from a tuition ΔT are a function of the level of tuition, offsetting financial aid, and the change (probable decline) in enrollment resulting from the tuition:

$$\begin{aligned}\Delta TR &= \Delta T\left[E + \Delta E\right] \\ &= \Delta T\left[E + \frac{e(\Delta P)E}{P}\right] \\ &= \Delta T\left[E + \frac{e(\Delta T - \Delta F_S - \Delta F_F)E}{P}\right]\end{aligned}$$

Reduced community college revenue from the public sector (i.e., change in General Fund revenue, ΔGFR) is a function of the reduced enrollment ΔE and the unit rate S at which public revenues are allocated for each of those enrollments:

$$\begin{aligned}\Delta GFR &= S\left[\Delta E\right] \\ &= S\,\frac{\left[e(\Delta P)E\right]}{P} \\ &= S\,\frac{\left[e(\Delta T - \Delta F_S - \Delta F_F)E\right]}{P}\end{aligned}$$

The total revenue impact ΔR of a community college tuition ΔT would be:

$$\Delta R = \Delta T \left[E + \left(\frac{e[\Delta T - \Delta F_S - \Delta F_F] E}{P} \right) \right] + \left[S \left(\frac{e[\Delta T - \Delta F_S - \Delta F_F] E}{P} \right) \right]$$

Thus far, the discussion has ignored price actions by institutions that provide close substitutes for the kinds of education provided in community colleges: transfer and general education (UC and CSU), occupational education (proprietary schools, CETA, military, business, etc.) and community and developmental education (K-12 adult schools, etc.). Changes in the prices charged students by these institutions will impact community college enrollments. This impact can be derived from the cross-price elasticity of demand for community college enrollment.

$$\Delta E = e_k^* \frac{(\Delta P_k) E}{P_k}$$

where,

e_k^* = The cross-price elasticity of demand for enrollments in community colleges with respect to changes in the price of instruction at institution k, such as CSU or UC, and

ΔP_k = price change at institution k.

The cross-price elasticity e^*, will always be positive when derived with respect to the price charged at one or another of the segments described above that are close substitutes for the community colleges' educational functions.

Continuing to omit the summation and subscript notation (except to distinguish the two different elasticity coefficients), the impact of price changes in as many other institutions or segments as are felt to be relevant can be included in the model by adding terms for the related enrollment impact ΔE to both revenue statements: ΔTR and ΔGFR:

$$\Delta R = \Delta TR + \Delta GFR$$

$$= \Delta T \left[E + \left(\frac{e[\Delta T - F_s - F_F]\ E}{P} \right) + \left(\frac{e_k^* (\Delta P_k)\ E}{P_k} \right) \right] +$$

$$S \left[\left(\frac{e[\Delta T - F_s - F_F]\ E}{P} \right) + \left(\frac{e_k^* (\Delta P_k\ E}{P_k} \right) \right]$$

The following analysis attempts to fit actual and estimated data to these equations.

BASIC DATA USED IN MODEL

Price

Both the revenue model and estimates of price elasticity , are influenced by the existing cost or price of enrollment P. This cost includes those outlays individuals incur only because they are students:

tuition and fees
books and other out-of-pocket expenses
housing (in some cases)
transportation
earnings or opportunities foregone (because of college attendance)
child care

Subsistence costs such as food and most housing are excluded from this list since they would be faced even if an individual were not a student. The element of foregone earnings is debated, some saying that it is not as much a part of an individual's decision about college attendance as is normal subsistence.

The community college emphasis on occupational education and observed relationship between labor market trends and community college enrollment suggests that foregone earnings are a very real part of the student's enrollment decision.

Other factors being equal, when employment opportunities increase (and the cost of foregone earnings increases due to the increased probability of obtaining employment), community college enrollment decreases. In practice, most community college students (about six out of ten in California) work while enrolled and, therefore, do not totally forego earnings; though they could possibly work more if not enrolled.

Another, perhaps more important observation about the costs of enrollment is that even the tuition-free California Community Colleges are not cost-free. Even forgetting the controversial category of foregone earnings, the current annual cost or price, P, facing a community college full-time lower division student is estimated at over $750 for a nine-month attendance period (see Table 1).

This assumes, of course, that individuals value money spent on transportation, for instance, in the same way they value money spent on tuition and fees when deciding to enroll. Some argue that each dollar of tuition and/or fees, due to the way it is spent (usually all at once), is more "important" to the individual than each dollar spent for transportation.

As noted above, the change in price ΔP facing students is less than the advertised tuition by the amount of financial aid forthcoming from federal and/or state sources:

$$\Delta P = \Delta T - (\Delta F_S + F_F)$$

Except for EOPS, financial aid programs typically require a student load of six or more credit units. Consequently, only half of all community college students enrolled in credit classes would be eligible for any federal aid. Further, roughly one-half of those eligible fall into the income categories for which aid is available (less than about $15,000 and the normal number of dependents). These individuals, then qualify for one-half any cost increase. Recent experience shows that less than half of community college students currently eligible actually apply for and receive Pell Grants.

The amount of financial aid offset calculation in the simulation is based on 1979-80 data from a study by the College Entrance Examination Board on Student Economics and Resources (SEARS). Item 46 of this survey requested student response to a question: What is the total amount of scholarship, fellowships, and grants assistance awarded you for the 1980-81 academic year? The respondent was instructed to include Basic Grants (BEOG), Cal Grants, SEOG or EOP/S Grants, or other similar assistance received.

An analysis of the responses to this question is contained in Table 2. The highest amount of financial assistance was reported by low income self-supporting students who received an average of $913. For purposes of analysis, the $913 category was used as a base value for computing the relative amount of aid received by the other categories of students when faced by an increase in fees. These ratios serve as a means to distributing the incidence of financial assistance for each of the 30 cells in the model.

The implications of possible reductions in federal financial aid have not yet been estimated.

Price Elasticity

Estimates for the price elasticity of community college enrollment demand are based upon the research reviewed in Appendix A. The assumed elasticities are based upon observed differences that are related to income level and dependency status (see Table 3).

Institutional Support Levels

A general tuition levy affects the support level of an institution in two ways. First, extra revenue is realized amounting to the product of the per student levy and the remaining enrollment. Second, the tuition revenue is offset by reduced general fund support amounting to the product of enrollment loss and the general fund support rate per student. (Because the latter support rate per student is substantially higher than the tuition rate, a nominal tuition levy may be entirely offset by loss in general fund revenue.) Table 4 illustrates the support rates used to compute changes in tuition and general fund support.

TABLE 1

PRICE OF ATTENDANCE OF A
FULL-TIME LOWER DIVISION STUDENT
IN THE PUBLIC SEGMENTS OF HIGHER EDUCATION
NINE MONTH ESTIMATE
CALIFORNIA RESIDENTS

	COMMUNITY COLLEGES		STATE UNIVERSITY		UNIVERSITY OF CALIF.	
	1980 [1]	1981 [2]	1980 [1]	1981 [2]	1980 [1]	1981 [2]
ENROLLMENT-RELATED EXPENSES						
Fees	$ 15	$ 20	$ 225	$ 250	$ 739	$ 1,003
Transportation	452	506	334	374	334	260
Books and Supplies	224	251	245	274	263	295
	(691)	(777)	(804)	(898)	(1,236)	(1,560)
OTHER LIVING EXPENSES						
Child Care	117	131	116	130	110	123
Personal and Miscellaneous	1,401	1,569	1,288	1,443	1,028	1,146
Medical and Dental	450	504	387	443	342	383
Vehicle Maintenance	1,604	1,796	1,373	1,538	1,062	1,189
Housing	2,222	2,489	2,082	2,332	1,799	2,015
Food	1,625	1,820	1,407	1,576	1,161	1,300
	(7,419)	(8,309)	(6,653)	(7,462)	(5,502)	(6,156)
TOTAL	$ 8,110	$9,086	$7,457	$8,360	$6,738	$7,716

1/

SOURCES: A Report on the Expenses and Resources (SEARS) of Students Enrolled in California Postsecondary Institutions During the 1979-80 Academic Year. California Student Aid Commission.

1/ Based on 1979-80 SEARS data.

2/ Aside from actual fee increases, assumes a 12 percent cost-of-living adjustment.

TABLE 2

AVERAGE SCHOLARSHIPS AND GRANTS RECEIVED
BY STUDENTS ELIGIBLE UNDER FEDERAL CRITERIA[a/]
WINTER, 1980

SEGMENT	DEPENDENT ≤$12,000	DEPENDENT $12,000 - $29,999	DEPENDENT ≥$30,000+	SELF-SUPPORTING ≤$ 5,499	SELF-SUPPORTING $ 5,500 - $10,700	SELF-SUPPORTING ≥$10,800+
COMMUNITY COLLEGE						
12+ Units	$ 740 (.811)[b/]	$ 477 (.523)	$ 477 (.523)	$ 913 (1.000)	$ 411 (.450)	$ 338 (.370)
9 - 11 Units	$ 195 (.214)	$ 173 (.190)	$ 143 (.157)	$ 440 (.482)	$ 105 (.115)	$ 11 (.012)
6 - 8 Units	$ 53 (.058)	$ 82 (.058)	$ 20 (.022)	$ 133 (.146)	$ 47 (.052)	$ 0 (.000)
1 - 5 Units	$ 27 (.030)	$ 23 (.025)	$ 0 (.000)	$ 32 (.035)	$ 11 (.012)	$ 0 (.000)

SOURCE: SEARS Survey (see Table 1).

[a/] Based on usable data for 3,295 cases.

[b/] Ratio of value in this cell divided by $913 (the value for low income, self-supporting students).

NOTE: For fee increases, it is assumed that 85 percent of the most needy (i.e., lowest income self-supporting student) would receive the full aid offset. For example, about half ($25) of a $50 fee increase would be offset (primarily by Pell Grants). In that case, the most needy are assumed to receive an average fee offset of $21 ($25 X .85), or a net price increase of $4.

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TABLE 3

ASSUMED PRICE ELASTICITY OF ENROLLMENT DEMAND FOR
CALIFORNIA COMMUNITY COLLEGES
BY STUDENT DEPENDENCY AND INCOME STATUS

UNIT LOAD	OVERALL ELASTICITY	DEPENDENT ON PARENTS/OTHERS ≤ $12,000	$12,000 - $29,000	≥ $30,000	SELF-SUPPORTING STUDENTS ≤ $5,499	$5,500 - $10,799	≥ $10,800
COMMUNITY COLLEGES							
12+ Units							
9 - 11 Units	-0.5	-0.7194	-0.3597	-0.2398	-0.9243	-0.4548	-0.3081
6 - 8 Units	-0.8	-1.2158	-0.6079	-0.4053	-1.4419	-0.7095	-0.4806
Less Than 6 Units							
Noncredit							

1/ The elasticity coefficients for each category of student based on dependency status and income level assumes that low income students are twice and high income students are two-thirds as responsive as middle income students. The elasticity for self-supporting student is equal to that for dependent students minus 0.1 for each like category of student. (See Appendix A.)

TABLE 4

GENERAL FUND SUPPORT
PER FULL-TIME LOWER DIVISION ENROLLMENT
CHANGE IN THE PUBLIC SEGMENTS OF HIGHER EDUCATION

1981-82

SEGMENT			
Community Colleges			
Credit	2/3 (1,855)	=	$ 1,237
Noncredit			1,100
State University and Colleges			1,965
University of California	(15 credit units)		3,573

Enrollment Estimates

Estimates of the distribution of enrollment by dependency status and income level for the three segments are shown in Table 5. Two sources of information are used to develop this distribution. First, census data available from the Chancellor's Office enrollment report were used to determine enrollment by each of the five categories of unit loading. Second, the distribution of dependency status and income level for each unit load category was based on a separate analysis of SEARS data. This two-step estimate was necessary because sample bias due to over-representation of full-time students existed in the SEARS data. By controlling for unit loading, this bias was reduced. Table 6 shows the percentage distribution for student income and dependency derived from the SEARS data and used to estimate enrollments in Table 5.

TABLE 5

LOWER DIVISION ENROLLMENT IN
THE CALIFORNIA PUBLIC SEGMENTS OF HIGHER EDUCATION
BY DEPENDENCY STATUS AND INCOME
FALL 1980

SEGMENT/LOAD	TOTAL	DEPENDENT			SELF-SUPPORTING		
		≤$12,000	$12,000-$29,999	$30,000+	≤$5,499	$5,500-$10,799	$10,800+
COMMUNITY COLLEGES [1]							
12+ Units	295,743	71,325	77,053	36,402	60,131	42,133	8,699
9 - 11 Units	240,128	22,222	58,144	21,712	35,368	87,137	15,545
6 - 8 Units	99,812	8,353	12,696	6,150	15,917	48,404	8,292
Less than 6 Units	556,056	28,766	55,220	35,177	65,534	304,165	67,194
Noncredit	199,227	10,308	19,786	12,604	23,483	108,989	24,077
STATE UNIVERSITY AND COLLEGES							
Full-Time	83,564	11,281	29,164	25,738	8,458	7,898	1,029
Part-Time	9,543	763	1,771	1,354	1,016	4,061	583
UNIVERSITY OF CALIFORNIA							
Full-Time	50,451	3,996	13,199	18,407	5,926	7,894	1,029
Part-Time	1,378	44	200	301	252	525	56

[1] Represents total enrollments by unit load from census data in Chancellor's Information System, with each load level distributed for dependency status and income level based on SEARS data for students meeting federal government conditions for financial aid eligibility.

TABLE 6

PERCENTAGE DISTRIBUTION OF LOWER DIVISION ENROLLMENT
BY DEPENDENCY STATUS AND INCOME LEVEL

1980

SEGMENT/LOAD	TOTAL	DEPENDENT			SELF-SUPPORTING		
		≤$12,000	$12,000-$29,999	$30,000+	≤$5,499	$5,500-$10,799	$10,800+
COMMUNITY COLLEGES [1/]							
12+ Units	100.0	24.1	26.1	12.3	20.3	14.2	3.0
9 - 11 Units	100.0	9.3	24.2	9.0	14.7	36.3	6.5
6 - 8 Units	100.0	8.3	12.7	6.2	16.0	48.5	8.3
Less than 6 Units	100.0	5.2	9.9	6.3	11.8	54.7	12.1
Noncredit	100.0	5.2	9.9	6.3	11.8	54.7	12.1
STATE UNIVERSITY AND COLLEGES							
Full-Time	100.0	13.5	34.9	30.8	10.1	9.5	1.2
Part-Time	100.0	8.0	18.5	14.2	10.6	42.6	6.1
UNIVERSITY OF CALIFORNIA							
Full-Time	100.0	7.9	26.1	36.5	11.8	15.7	2.0
Part-Time	100.0	3.2	14.5	21.8	18.3	38.1	4.1

SOURCE: SEARS Survey.

Type of Student

Once the enrollment changes for different policies are determined, it is possible to compute the number of students by demographic characteristic (i.e., gender, age, race, and prior education level) affected. This is achieved by using SEARS data to develop a profile of students for each dependency status and income level. The incidence of each demographic characteristic is then applied to enrollment change to compute the types of students affected by the tuition policy.

For purposes of this profile, no disaggregation for unit loads was made for a given income level under dependency status. That is, for a given income level under each dependency status, full-time and part-time students were combined to develop a profile.

Because the SEARS data had a response bias, it was adjusted using the known incidence of characteristics from the census of student enrollments in the Chancellor's Office Information System. Independent adjustments were made for the characteristic age, gender, race and prior education level. Table 7 shows the adjusted percentage distribution for each student characteristic used in the simulation model.

Cross-Price Elasticity

It is likely that any general increase in community college tuition and fees would take place with a simultaneous increase in tuition and fees at CSU and UC, as well as possible increases in fees at K-12 adult schools. Consequently, the enrollment impact described above would be lessened somewhat. The question is by how much? There are no estimates on the cross-price elasticity of demand for enrollment at public institutions within a state.

TABLE 7

PERCENT DISTRIBUTION OF
ENROLLMENT BY CHARACTERISTIC[a/]

	DEPENDENT PARENT INCOME			SELF-SUPPORTING TOTAL INCOME		
	$0-$11,999	$12,000-$29,999	$30,000+	$0-$5,499	$ 5,500-$10,799	$10,800+
	LOW	MEDIUM	HIGH	LOW	MEDIUM	HIGH
RACE						
Amr. Ind./Asian	11.03	9.75	7.55	14.08	6.1	6.7
Black	16.25	6.35	4.2	16.6	7.1	8.95
Hispanic	31.64	15.65	4.56	15.96	4.86	7.26
White	41.08	68.25	83.78	53.36	81.94	77.09
PRIOR UNITS						
Soph. or Less	89.77	88.79	87.87	84.1	72.89	67.39
Jr. - Sr.	9.28	9.35	9.15	72.89	13.34	13.77
B.A. or More	0.95	1.86	2.98	67.39	16.66	15.95
SEX						
Female	59.23	52.38	54.46	62.63	55.35	49.7
Male	40.77	47.62	45.54	37.37	44.65	50.3
AGE						
21 or Less	86.0	88.0	85.44	17.4	6.55	3.01
22 - 29	11.43	10.42	13.13	43.47	44.73	27.13
30 - 61	2.57	1.58	1.4	36.0	44.62	52.78
62 or More	0	0	0	3.13	4.1	17.08

[a/] Adjusted on the basis of known incidence of characteristic in the Chancellor's Office Information System.

SOURCE: SEARS Survey; Chancellor's Office Information System

In the absence of any valid estimates of cross-price elasticity, another direct, though second-best, approach would be to:

first, derive the other institution's own price elasticity;

second, calculate the number of that institution's students who will cease enrollment at a given price increase;

third, estimate (using transfer and other behavioral studies) the number of students leaving that institution who can be expected to enroll at a community college; and

finally, calculate the cross-price elasticity using community college enrollments and the other institution's prices.

The appropriate expressions (again excluding the summation and subscript notation for kind of student) are:

$$\Delta E_k^j = \varepsilon_k^j \frac{\Delta P_k \; E_k}{P_k}$$

$$\Delta E_j = a \, \Delta E_k$$

$$\varepsilon_k^* = \frac{\Delta E_j \; (P_k)}{E_j \; (\; P_k)}$$

Where,

E_k^j = students enrolled at institution K who could consider community college a close substitute,

ΔE_k^j = the change in enrollment of E_k^j resulting from the change in price ΔP_k, at institution k,

a = the proportion of E_k^j that can be expected to transfer to community college, and

ε_k^* = the cross-price elasticity of demand for the community college relative to the price of the kth institution.

Once these values are derived, they may be used, as noted earlier, for the revenue model.

Using earlier California Postsecondary Education Commission (CPEC) estimates, for example, tuition increases of $378 (on $205) for students taking more than six units at CSU and $310 (on $175) for those taking six or less units at CSU would result in an overall undergraduate enrollment loss of 16 percent. (CPEC estimates of the average price elasticity $e_k = -.26$ mean that $\Delta P_k = \$118$ where P_k averages $191 for all students.)

Assuming that all those in CSU lower division consider community colleges as a reasonable close substitute,

$$E_k^j = 93,107$$

$$\Delta E_k^j = 93,107\ (.16) = 14,897$$

Further assuming that half of these departing students can be expected to attend a community college (i.e., $a = .5$),

$$\Delta E_j = 7,449$$

The cross-price elasticity of demand, e_k^*, for community colleges with respect to changes in tuition or price at CSU can now be calculated:

$$e_k^* = \frac{7,449\ \ (191)}{1,390,986\ \ (118)} = +.0086$$

Obviously, derivations of ΔE_k^j and a are based on assumptions which need to be studied and made more precise.

PROGRAM

The following program for the simulation was written using the Statistical Analysis System (SAS). Specifications are for statewide data. However, the program can be used for district or college-level specifications. WARNING: data for UC and CSU are hypothetical and were used only to test the program. These data should not be used for actual simulations.

```
NOTE: THE JOB CCTUITN HAS BEEN RUN UNDER RELEASE 79.5 OF SAS AT STEPHEN P. TEALE DATA CENTER (0000*).
NOTE: NO OPTIONS SPECIFIED.

      COMMENT  NT NET TUITION
               L  ELASTICITY
               P  PRICE TO STUDENT FOR ATTENDANCE
               E  ENROLLMENT
               R  REVENUE TO INSTITUTION
               F  FINANCIAL AID CHANGE PER STUD
               FA CHANGE IN AMOUT OF FIN AID
               CT CHANGE IN TUITION
               CE CHANGE IN ENROLLMENT
               CR CHANGE IN REVENUE
               CTRCC CHANGE IN TUITION REVENUE
               CGFRCC CHANGE IN GENERAL FUND REVENUE
               CADA CHANGE IN ADA
               ELI LOW INCOME ENROLLMENT
               EMI MID INCOME ENROLLMENT
               EHI HI  INCOME ENROLLMENT
               CR CHANGE IN REVENUE
               SU CALIF STATE UNIV AND COLLEGES
               UC UNIVERITY OF CALIF
               CC CALIF COMM COLLEGES
               IJ WHERE I=ROW AND J=COLUMN DEFINED AS FOLLOWS
                  1J 1= 12 PLUS UNITS
                  2J 2= 9-11 UNITS
                  3J 3= 6-8  UNITS
                  4J 4= LT 6 UNITS
                  5J 5= NONCREDIT CC STUDENTS
                  6J 6= SU FT STUDENTS
                  7J 7= SU PT STUDENTS
                  8J 8= UC FT STUDENTS
                  9J 9= UC PT STUDENTS
                  I1 1=DEPENDENT INC LT$12000
                  I2 2=DEPENDENT INC $12-29999
                  I3 3=DEPENDENT INC $29999 PLUS
                  I4 4=INDEPENDENT INC LT $5499
                  I5 5=INDEPENDENT INC $5500-10799
                  I6 6=INDEPENDENT INC $10800PLUS;
      DATA A1;
       E11=71325;   E12=77053;   E13=36402;   E14=60131;   E15=42133;   E16=8699;
       E21=22222;   E22=58144;   E23=21712;   E24=35368;   E25=87137;   E26=15545;
       E31=8355;    E32=12696;   E33=6150;    E34=15917;   E35=48404;   E36=8292;
       E41=28766;   E42=55220;   E43=35177;   E44=65534;   E45=304165;  E46=67194;
       E51=10308;   E52=19786;   E53=12604;   E54=23483;   E55=108989;  E56=24077;
       E61=11281;   E62=29164;  E63=25738;  E64=8458;  E65= 7898;  E66=1029;
       E71=763   ;  E72=1771;  E73= 1354;  E74=1016;  E75=4061;  E76 =583;
       E81=3496;    E82=13199;  E83=18407; E84=5926; E85=7894;  E86= 1029;
       E91=44;      E92=200;    E93=301;   E94=252;    E95=525;  E96=56;
        NT11=32,97;NT12=39,02;NT13=39,02;NT14=29,00;NT15=40,55;NT16=42,23;
        NT21=45,51;NT22=46,01;NT23=46,70;NT24=39,88;NT25=47,58;NT26=49,75;
        NT31=48,78;NT32=48,78;NT33=49,54;NT34=46,94;NT35=49,91;NT36=50,00;
        NT41=29,37;NT42=29,47;NT43=30,00;NT44=29,26;NT45=29,75;NT46=30,00;
        NT51=30,00;NT52=30,00;NT53=30,00;NT54=30,00;NT55=30,00;NT56=30,00;
        NT61=400,0;NT62=400,0;NT63=400,0;NT64=400,0;NT65=400,0;NT66=400,0;
        NT71=200,0;NT72=200,0;NT73=200,0;NT74=200,0;NT75=200,0;NT76=200,0;
```

```
      NT81=600.0;NT82=600.0;NT83=600.0;NT84=600.0;NT85=600.0;NT86=600.0;
      NT91=300.0;NT92=300.0;NT93=300.0;NT94=300.0;NT95=300.0;NT96=300.0;
      F11=17.03;F12=10.98;F13=10.98;F14=21.00;F15=9.450;F16=7.77;
      F21=4.49 ;F22=3.99 ;F23=3.30 ;F24=10.12;F25=2.42 ;F26=0.25;
      F31=1.22 ;F32=1.22 ;F33= 0.46;F34=3.06 ;F35= 1.09;F36=0.00;
      F41=0.63 ;F42= 0.53;F43= 0.00;F44= 0.70;F45= 0.25;F46=0.00;
      F51=  .00;F52=  .00;F53= 0.00;F54= 0.00;F55= 0.00;F56=0.00;
                  FA11 = F11*E11 ;
                  FA12 = F12*E12 ;
                  FA13 = F13*E13 ;
                  FA14 = F14*E14 ;
                  FA15 = F15*E15 ;
                  FA16 = F16*E16 ;
                  FA21 = F21*E21 ;
                  FA22 = F22*E22 ;
                  FA23 = F23*E23 ;
                  FA24 = F24*E24 ;
                  FA25 = F25*E25 ;
                  FA26 = F26*E26 ;
                  FA31 = F31*E31 ;
                  FA32 = F32*E32 ;
                  FA33 = F33*E33 ;
                  FA34 = F34*E34 ;
                  FA35 = F35*E35 ;
                  FA36 = F36*E36 ;
                  FA41 = F41*E41 ;
                  FA42 = F42*E42 ;
                  FA43 = F43*E43 ;
                  FA44 = F44*E44 ;
                  FA45 = F45*E45 ;
                  FA46 = F46*E46 ;
                  FA51 = F51*E51 ;
                  FA52 = F52*E52 ;
                  FA53 = F53*E53 ;
                  FA54 = F54*E54 ;
                  FA55 = F55*E55 ;
                  FA56 = F56*E56 ;
                  FA1  = FA11+FA12+FA13+FA14+FA15+FA16;
                  FA2  = FA21+FA22+FA23+FA24+FA25+FA26;
                  FA3  = FA31+FA32+FA33+FA34+FA35+FA36;
                  FA4  = FA41+FA42+FA43+FA44+FA45+FA46;
                  FA5  = FA51+FA52+FA53+FA54+FA55;
                  FAT  = FA1 +FA2 +FA3 +FA4 +FA5;
    L11=-0.7194;L12=-0.3597; L13=-0.2398; L14=-0.9243;L15=-0.4546;L16=-0.3081;
    L61=-0.8000;L62=-0.4000; L63=-0.2000; L64=-1.0000;L65=-0.5000;L66=-0.3000;
    L71=-0.8000;L72=-0.4000; L73=-0.2000; L74=-1.0000;L75=-0.5000;L76=-0.3000;
    L81=-0.6000;L82=-0.3000; L83=-0.2000; L84=-0.8000;L85=-0.4000;L86=-0.2000;
    L91=-0.6000;L92=-0.3000; L93=-0.2000; L94=-0.8000;L95=-0.4000;L96=-0.2000;
  P11=526;P12=526;P13=526;P14=526;P15=526;P16=526;
  P21=465;P22=465;P23=465;P24=465;P25=465;P26=465;
  P31=465;P32=465;P33=465;P34=465;P35=465;P36=465;
  P41=396;P42=396;P43=396;P44=396;P45=396;P46=396;
  P51=396;P52=396;P53=396;P54=396;P55=396;P56=396;
  P61=704;P62=704;P63=704;P64=704;P65=704;P66=704;
  P71=352;P72=352;P73=352;P74=352;P75=352;P76=352;
  P81=999;P82=999;P83=999;P84=999;P85=999;P86=999;
  P91=500;P92=500;P93=500;P94=500;P95=500;P96=500;
                  R16 = 1376 ;
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                    R26 =  829 ;
                    R36 = 578 ;
                    R46 = 329 ;
                    R56 = 329  ;
                    R66 =1965  ;
                    R76 = 786  ;
                    R86 =3573  ;
                    R96 =1999  ;
     CT16=50  ;CT26=50  ;CT36=50 ;CT46=30;CT56=30; CT66=400;CT76=200;CT86=600;
     CT96=500;
                    CE11 = ((NT11)/P11)*L11*E11 ;
                    CE12 = ((NT12)/P12)*L12*E12 ;
                    CE13 = ((NT13)/P13)*L13*E13 ;
                    CE14 = ((NT14)/P14)*L14*E14 ;
                    CE15 = ((NT15)/P15)*L15*E15 ;
                    CE16 = ((NT16)/P16)*L16*E16 ;
                    CE21 = ((NT21)/P21)*L11*E21 ;
                    CE22 = ((NT22)/P22)*L12*E22 ;
                    CE23 = ((NT23)/P23)*L13*E23 ;
                    CE24 = ((NT24)/P24)*L14*E24 ;
                    CE25 = ((NT25)/P25)*L15*E25 ;
                    CE26 = ((NT26)/P26)*L16*E26 ;
                    CE31 = ((NT31)/P31)*L11*E31 ;
                    CE32 = ((NT32)/P32)*L12*E32 ;
                    CE33 = ((NT33)/P33)*L13*E33 ;
                    CE34 = ((NT34)/P34)*L14*E34 ;
                    CE35 = ((NT35)/P35)*L15*E35 ;
                    CE36 = ((NT36)/P36)*L16*E36 ;
                    CE41 = ((NT41)/P41)*L11*E41 ;
                    CE42 = ((NT42)/P42)*L12*E42 ;
                    CE43 = ((NT43)/P43)*L13*E43 ;
                    CE44 = ((NT44)/P44)*L14*E44 ;
                    CE45 = ((NT45)/P45)*L15*E45 ;
                    CE46 = ((NT46)/P46)*L16*E46 ;
                    CE51 = ((NT51)/P51)*L11*E51 ;
                    CE52 = ((NT52)/P52)*L12*E52 ;
                    CE53 = ((NT53)/P53)*L13*E53 ;
                    CE54 = ((NT54)/P54)*L14*E54 ;
                    CE55 = ((NT55)/P55)*L15*E55 ;
                    CE56 = ((NT56)/P56)*L16*E56 ;
                    CE61 = ((NT61)/P61)*L61*E61 ;
                    CE62 = ((NT62)/P62)*L62*E62 ;
                    CE63 = ((NT63)/P63)*L63*E63 ;
                    CE64 = ((NT64)/P64)*L64*E64 ;
                    CE65 = ((NT65)/P65)*L65*E65 ;
                    CE66 = ((NT66)/P66)*L66*E66 ;
                    CE71 = ((NT71)/P71)*L71*E71 ;
                    CE72 = ((NT72)/P72)*L72*E72 ;
                    CE73 = ((NT73)/P73)*L73*E73 ;
                    CE74 = ((NT74)/P74)*L74*E74 ;
                    CE75 = ((NT75)/P75)*L75*E75 ;
                    CE76 = ((NT76)/P76)*L76*E76 ;
                    CE81 = ((NT81)/P81)*L81*E81 ;
                    CE82 = ((NT82)/P82)*L82*E82 ;
                    CE83 = ((NT83)/P83)*L83*E83 ;
                    CE84 = ((NT84)/P84)*L84*E84 ;
                    CE85 = ((NT85)/P85)*L85*E85 ;
                    CE86 = ((NT86)/P86)*L86*E86 ;
                    CE91 = ((NT91)/P91)*L91*E91 ;
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170          CE92 = ((NT92)/P92)*L92*E92 ;
171          CE93 = ((NT93)/P93)*L93*E93 ;
172          CE94 = ((NT94)/P94)*L94*E94 ;
173          CE95 = ((NT95)/P95)*L95*E95 ;
174          CE96 = ((NT96)/P96)*L96*E96 ;
175          CR11 = (E11 + CE11)*CT16 + CE11*R16 ;
176         CTR11 = (E11 + CE11)*CT16 ;
177        CGFR11 =                    CE11*R16 ;
178          CR12 = (E12 + CE12)*CT16 + CE12*R16 ;
179         CTR12 = (E12 + CE12)*CT16;
180        CGFR12 =                    CE12*R16 ;
181          CR13 = (E13 + CE13)*CT16 + CE13*R16 ;
182         CTR13 = (E13 + CE13)*CT16 ;
183        CGFR13 =                    CE13*R16 ;
184          CR14 = (E14 + CE14)*CT16 + CE14*R16 ;
185         CTR14 = (E14 + CE14)*CT16 ;
186        CGFR14 =                    CE14*R16 ;
187          CR15 = (E15 + CE15)*CT16 + CE15*R16 ;
188         CTR15 = (E15 + CE15)*CT16 ;
189        CGFR15 =                    CE15*R16 ;
190          CR16 = (E16 + CE16)*CT16 + CE16*R16 ;
191         CTR16 = (E16 + CE16)*CT16 ;
192        CGFR16 =                    CE16*R16 ;
193          CR21 = (E21 + CE21)*CT26 + CE21*R26 ;
194         CTR21 = (E21 + CE21)*CT26 ;
195        CGFR21 =                    CE21*R26 ;
196          CR22 = (E22 + CE22)*CT26 + CE22*R26 ;
197         CTR22 = (E22 + CE22)*CT26 ;
198        CGFR22 =                    CE22*R26;
199          CR23 = (E23 + CE23)*CT26 + CE23*R26 ;
200         CTR23 = (E23 + CE23)*CT26 ;
201        CGFR23 =                    CE23*R26 ;
202          CR24 = (E24 + CE24)*CT26 + CE24*R26 ;
203         CTR24 = (E24 + CE24)*CT26 ;
204        CGFR24 =                    CE24*R26 ;
205          CR25 = (E25 + CE25)*CT26 + CE25*R26 ;
206         CTR25 = (E25 + CE25)*CT26 ;
207        CGFR25 =                    CE25*R26 ;
208          CR26 = (E26 + CE26)*CT26 + CE26*R26 ;
209         CTR26 = (E26 + CE26)*CT26 ;
210        CGFR26 =                    CE26*R26 ;
211          CR31 = (E31 + CE31)*CT36 + CE31*R36 ;
212         CTR31 = (E31 + CE31)*CT36 ;
213        CGFR31 =                    CE31*R36 ;
214          CR32 = (E32 + CE32)*CT36 + CE32*R36 ;
215         CTR32 = (E32 + CE32)*CT36 ;
216        CGFR32 =                    CE32*R36 ;
217          CR33 = (E33 + CE33)*CT36 + CE33*R36 ;
218         CTR33 = (E33 + CE33)*CT36 ;
219        CGFR33 =                  + CE33*R36 ;
220          CR34 = (E34 + CE34)*CT36 + CE34*R36 ;
221         CTR34 = (E34 + CE34)*CT36 ;
222        CGFR34 =                    CE34*R36 ;
223          CR35 = (E35 + CE35)*CT36 + CE35*R36 ;
224         CTR35 = (E35 + CE35)*CT36 ;
225        CGFR35 =                    CE35*R36 ;
226          CR36 = (E36 + CE36)*CT36 + CE36*R36 ;
227         CTR36 = (E36 + CE36)*CT36 ;
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228                CGFR36 =                                CE36*R36 ;
229                  CR41 = (E41 + CE41)*CT46 + CE41*R46 ;
230                 CTR41 = (E41 + CE41)*CT46 ;
231                CGFR41 =                                CE41*R46 ;
232                  CR42 = (E42 + CE42)*CT46 + CE42*R46 ;
233                 CTR42 = (E42 + CE42)*CT46 ;
234                  CR42 = (E42 + CE42)*CT46 + CE42*R46 ;
235                 CTR42 = (E42 + CE42)*CT46 ;
236                CGFR42 =                                CE42*R46 ;
237                  CR43 = (E43 + CE43)*CT46 + CE43*R46 ;
238                 CTR43 = (E43 + CE43)*CT46 ;
239                CGFR43 =                                CE43*R46 ;
240                  CR44 = (E44 + CE44)*CT46 + CE44*R46 ;
241                 CTR44 = (E44 + CE44)*CT46;
242                CGFR44 =                                CE44*R46 ;
243                  CR45 = (E45 + CE45)*CT46 + CE45*R46 ;
244                 CTR45 = (E45 + CE45)*CT46;
245                CGFR45 =                                + CE45*R46 ;
246                  CR46 = (E46 + CE46)*CT46 + CE46*R46 ;
247                 CTR46 = (E46 + CE46)*CT46;
248                CGFR46 =                                CE46*R46 ;
249                  CR51 = (E51 + CE51)*CT56 + CE51*R56 ;
250                 CTR51 = (E51 + CE51)*CT56 ;
251                CGFR51 =                                CE51*R56 ;
252                  CR52 = (E52 + CE52)*CT56 + CE52*R56 ;
253                 CTR52 = (E52 + CE52)*CT56 ;
254                CGFR52 =                                CE52*R56 ;
255
256                  CR53 = (E53 + CE53)*CT56 + CE53*R56 ;
257                 CTR53 = (E53 + CE53)*CT56 ;
258                CGFR53 =                                CE53*R56 ;
259                  CR54 = (E54 + CE54)*CT56 + CE54*R56 ;
260                 CTR54 = (E54 + CE54)*CT56 ;
261                CGFR54 =                                CE54*R56 ;
262                  CR55 = (E55 + CE55)*CT56 + CE55*R56 ;
263                 CTR55 = (E55 + CE55)*CT56 ;
264                CGFR55 =                                CE55*R56 ;
265                  CR56 = (E56 + CE56)*CT56 + CE56*R56 ;
266                 CTR56 = (E56 + CE56)*CT56 ;
267                CGFR56 =                                CE56*R56 ;
268                  CR61 = (E61 + CE61)*CT66 + CE61*R66 ;
269                 CTR61 = (E61 + CE61)*CT66 ;
270                CGFR61 =                                CE61*R66 ;
271                  CR62 = (E62 + CE62)*CT66 + CE62*R66 ;
272                 CTR62 = (E62 + CE62)*CT66 ;
273                CGFR62 =                                CE62*R66 ;
274                  CR63 = (E63 + CE63)*CT66 + CE63*R66 ;
275                 CTR63 = (E63 + CE63)*CT66 ;
276                CGFR63 =                                CE63*R66 ;
277                  CR64 = (E64 + CE64)*CT66 + CE64*R66 ;
278                 CTR64 = (E64 + CE64)*CT66 ;
279                CGFR64 =                                CE64*R66 ;
280                  CR65 = (E65 + CE65)*CT66 + CE65*R66 ;
281                 CTR65 = (E65 + CE65)*CT66 ;
282                CGFR65 =                                CE65*R66 ;
283                  CR66 = (E66 + CE66)*CT66 + CE66*R66 ;
284                 CTR66 = (E66 + CE66)*CT66 ;
285                CGFR66 =                                CE66*R66 ;
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286          CR71 = (E71 + CE71)*CT76 + CE71*R76 ;
287         CTR71 = (E71 + CE71)*CT76 ;
288        CGFR71 =                    CE71*R76 ;
289          CR72 = (E72 + CE72)*CT76 + CE72*R76 ;
290         CTR72 = (E72 + CE72)*CT76 ;
291        CGFR72 =                    CE72*R76 ;
292          CR73 = (E73 + CE73)*CT76 + CE73*R76 ;
293         CTR73 = (E73 + CE73)*CT76 ;
294        CGFR73 =                    CE73*R76 ;
295          CR74 = (E74 + CE74)*CT76 + CE74*R76 ;
296         CTR74 = (E74 + CE74)*CT76 ;
297        CGFR74 =                    CE74*R76 ;
298          CR75 = (E75 + CE75)*CT76 + CE75*R76 ;
299         CTR75 = (E75 + CE75)*CT76 ;
300        CGFR75 =                    CE75*R76 ;
301          CR76 = (E76 + CE76)*CT76 + CE76*R76 ;
302         CTR76 = (E76 + CE76)*CT76 ;
303        CGFR76 =                    CE76*R76 ;
304          CR81 = (E81 + CE81)*CT86 + CE81*R86 ;
305         CTR81 = (E81 + CE81)*CT86 ;
306        CGFR81 =                    CE81*R86 ;
307          CR82 = (E82 + CE82)*CT86 + CE82*R86 ;
308         CTR82 = (E82 + CE82)*CT86 ;
309        CGFR82 =                    CE82*R86 ;
310          CR83 = (E83 + CE83)*CT86 + CE83*R86 ;
311         CTR83 = (E83 + CE83)*CT86 ;
312        CGFR83 =                    CE83*R86 ;
313          CR84 = (E84 + CE84)*CT86 + CE84*R86 ;
314         CTR84 = (E84 + CE84)*CT86 ;
315        CGFR84 =                    CE84*R86 ;
316          CR85 = (E85 + CE85)*CT86 + CE85*R86 ;
317         CTR85 = (E85 + CE85)*CT86 ;
318        CGFR85 =                    CE85*R86 ;
319          CR86 = (E86 + CE86)*CT86 + CE86*R86 ;
320         CTR86 = (E86 + CE86)*CT86 ;
321        CGFR86 =                    CE86*R86 ;
322          CR91 = (E91 + CE91)*CT96 + CE91*R96 ;
323         CTR91 = (E91 + CE91)*CT96 ;
324        CGFR91 =                    CE91*R96 ;
325          CR92 = (E92 + CE92)*CT96 + CE92*R96 ;
326         CTR92 = (E92 + CE92)*CT96 ;
327        CGFR92 =                    CE92*R96 ;
328          CR93 = (E93 + CE93)*CT96 + CE93*R96 ;
329         CTR93 = (E93 + CE93)*CT96 ;
330        CGFR93 =                    CE93*R96 ;
331          CR94 = (E94 + CE94)*CT96 + CE94*R96 ;
332         CTR94 = (E94 + CE94)*CT96 ;
333        CGFR94 =                    CE94*R96 ;
334          CR95 = (E95 + CE95)*CT96 + CE95*R96 ;
335         CTR95 = (E95 + CE95)*CT96 ;
336        CGFR95 =                    CE95*R96 ;
337          CR96 = (E96 + CE96)*CT96 + CE96*R96 ;
338         CTR96 = (E96 + CE96)*CT96 ;
339        CGFR96 =                    CE96*R96 ;
340        CREVCC1= CR11 + CR12 + CR13 + CR14 + CR15 + CR16 ;
341        CREVCC2= CR21 + CR22 + CR23 + CR24 + CR25 + CR26 ;
342        CREVCC3= CR31 + CR32 + CR33 + CR34 + CR35 + CR36 ;
343        CREVCC4= CR41 + CR42 + CR43 + CR44 + CR45 + CR46 ;
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344                    CREVCC5= CR51 + CR52 + CR53 + CR54 + CR55 + CR56 ;
345                    CREVSU6= CR61 + CR62 + CR63 + CR64 + CR65 + CR66 ;
346                    CREVSU7= CR71 + CR72 + CR73 + CR74 + CR75 + CR76 ;
347                    CREVUC8= CR81 + CR82 + CR83 + CR84 + CR85 + CR86 ;
348                    CREVUC9= CR91 + CR92 + CR93 + CR94 + CR95 + CR96 ;
349                    CREVCC = CREVCC1+CREVCC2+CREVCC3+CREVCC4+CREVCC5;
350                    CREVSU = CREVSU6+CREVSU7;
351                    CREVUC = CREVUC8+CREVUC9;
352                    CENRLCC1=CE11+CE12+CE13+CE14+CE15+CE16;
353                    CENRLCC2=CE21+CE22+CE23+CE24+CE25+CE26;
354                    CENRLCC3=CE31+CE32+CE33+CE34+CE35+CE36;
355                    CENRLCC4=CE41+CE42+CE43+CE44+CE45+CE46;
356                    CENRLCC5=CE51+CE52+CE53+CE54+CE55+CE56;
357                    CENRLSU6=CE61+CE62+CE63+CE64+CE65+CE66;
358                    CENRLSU7=CE71+CE72+CE73+CE74+CE75+CE76;
359                    CENRLUC8=CE81+CE82+CE83+CE84+CE85+CE86;
360                    CENRLUC9=CE91+CE92+CE93+CE94+CE95+CE96;
361                    CENRLCC = CENRLCC1 + CENRLCC2 + CENRLCC3 + CENRLCC4 +CENRLCC5;
362                    CENRLSU = CENRLSU6 + CENRLSU7 ;
363                    CENRLUC = CENRLUC8 + CENRLUC9 ;
364                    CTRCC1  = CTR11 + CTR12 + CTR13 + CTR14 + CTR15 + CTR16;
365                    CTRCC2  = CTR21 + CTR22 + CTR23 + CTR24 + CTR25 + CTR26;
366                    CTRCC3  = CTR31 + CTR32 + CTR33 + CTR34 + CTR35 + CTR36;
367                    CTRCC4  = CTR41 + CTR42 + CTR43 + CTR44 + CTR45 + CTR46;
368                    CTRCC5  = CTR51 + CTR52 + CTR53 + CTR54 + CTR55 + CTR56;
369                    CTRSU6  = CTR61 + CTR62 + CTR63 + CTR64 + CTR65 + CTR66;
370                    CTRSU7  = CTR71 + CTR72 + CTR73 + CTR74 + CTR75 + CTR76;
371                    CTRUC8  = CTR81 + CTR82 + CTR83 + CTR84 + CTR85 + CTR86;
372                    CTRUC9  = CTR91 + CTR92 + CTR93 + CTR94 + CTR95 + CTR96;
373                    CTRCCT  = CTRCC1+ CTRCC2+ CTRCC3+ CTRCC4+ CTRCC5;
374                    CTRSUT  = CTRSU6+ CTRSU7;
375                    CTRUCT  = CTRUC8+ CTRUC9;
376                   CGFRCC1  = CGFR11+ CGFR12+ CGFR13+ CGFR14+ CGFR15+CGFR16;
377                   CGFRCC2  = CGFR21+ CGFR22+ CGFR23+ CGFR24+ CGFR25+CGFR26;
378                   CGFRCC3  = CGFR31+ CGFR32+ CGFR33+ CGFR34+ CGFR35+CGFR36;
379                   CGFRCC4  = CGFR41+ CGFR42+ CGFR43+ CGFR44+ CGFR45+CGFR46;
380                   CGFRCC5  = CGFR51+ CGFR52+ CGFR53+ CGFR54+ CGFR55+CGFR56;
381                   CGFRSU6  = CGFR61+ CGFR62+ CGFR63+ CGFR64+ CGFR65+CGFR66;
382                   CGFRSU7  = CGFR71+ CGFR72+ CGFR73+ CGFR74+ CGFR75+CGFR76;
383                   CGFRUC8  = CGFR81+ CGFR82+ CGFR83+ CGFR84+ CGFR85+CGFR86;
384                   CGFRUC9  = CGFR91+ CGFR92+ CGFR93+ CGFR94+ CGFR95+CGFR96;
385                   CGFRCCT  = CGFRCC1+CGFRCC2+CGFRCC3+CGFRCC4+CGFRCC5;
386                   CGFRSUT  = CGFRSU6+CGFRSU7;
387                   CGFRUCT  = CGFRUC8+CGFRUC9;
388                   CADA1 = CENRLCC1*.9;
389                   CADA2 =CENRLCC2*.60;
390                   CADA3 =CENRLCC3*.42;
391                   CADA4 =CENRLCC4*.24;
392                   CADA5 =CENRLCC5*.24;
393                   CADA6 =CENRLSU6*1.00;
394                   CADA7 =CENRLSU7*.33;
395                   CADA8 =CENRLUC8*1.00;
396                   CADA9 =CENRLUC8*.33 ;
397                   CADAT1= CADA1+CADA2+CADA3+CADA4+CADA5;
398                   CADAT2= CADA1+CADA2+CADA3+CADA4+CADA5 +
399                           CADA6+CADA7+CADA8+CADA9;
400                   CFTESU= CADA6+CADA7;
401                   CFTEUC= CADA8+CADA9;
```


76

77

```
402                E1 = E11 + E12 + E13 + E14 + E15 + E16;
403                E2 = E21 + E22 + E23 + E24 + E25 + E26;
404                E3 = E31 + E32 + E33 + E34 + E35 + E36;
405                E4 = E41 + E42 + E43 + E44 + E45 + E46;
406                E5 = E51 + E52 + E53 + E54 + E55 + E56;
407                E6 = E61 + E62 + E63 + E64 + E65 + E66;
408                E7 = E71 + E72 + E73 + E74 + E75 + E76;
409                E8 = E81 + E82 + E83 + E84 + E85 + E86;
410                E9 = E91 + E92 + E93 + E94 + E95 + E96;
411                ECC= E1  + E2  + E3  + E4  + E5 ;
412                FCCR=E1  + E2  + E3  + E4 ;
413                ESU= E6  + E7 ;
414                EUC= E8  + E9 ;
415                ET = ECC + ESU + EUC ;
416                CENRCC6= -.40*CENRLSU6;
417                CENRCC7= -.40*CENRLSU7;
418                CENRCC8= -.25*CENRLUC8;
419                CENRCC9= -.25*CENRLUC9;
420                CR6CC  = -1*(CADA6*CT66 + CADA6*R66);
421                CR7CC  = -1*(CADA7*CT76 + CADA7*R76);
422                CR8CC  = -1*(CADA8*CT86 + CADA8*R86);
423                CR9CC  = -1*(CADA9*CT96 + CADA9*R96);
424                ADA1 = E1*1.0113;
425                ADA2 = E2*.6917;
426                ADA3 = E3*.4821;
427                ADA4 = E4*.2746;
428                ADA5 = E5*.3111;
429                ADAT = ADA1+ADA2+ADA3+ADA4+ADA5;
430                EDL  = E11 + E21 + E31 + E41 + E51;
431                ESL  = E14 + E24 + E34 + E44 + E54;
432
433               CEDL  =CE11 +CE21 +CE31 +CE41 + CE51;
434               CESL  =CE14 +CE24 +CE34 +CE44 + CE54;
435                EDM  = E12 + E22 + E32 + E42 + E52;
436                ESM  = E15 + E25 + E35 + E45 + E55;
437               CEDM  =CE12 +CE22 +CE32 +CE42 +  CE52;
438               CESM  =CE15 +CE25 +CE35 +CE45 + CE55;
439                EDH  = E13 + E23 + E33 + E43 + E53;
440                ESH  = E16 + E26 + E36 + E46 + E56;
441              CEDH   =CE13 +CE23 +CE33 +CE43 + CE53;
442              CESH   =CE16 +CE26 +CE36 +CE46 + CE56;
443             SEXFDL = CEDL*0.5923;
444             SEXFDM = CEDM*0.5238;
445             SEXFDH = CEDH*0.5446;
446             SEXFSL = CESL*0.6263;
447             SEXFSM = CESM*0.5535;
448             SEXFSH = CESH*0.4970;
449             SEXFL  = SEXFDL + SEXFSL;
450             SEXFM  = SEXFDM + SEXFSM;
451             SEXFH  = SEXFDH + SEXFSH;
452             SEXMDL = CEDL*0.4077;
453             SEXMDM = CEDM*0.4762;
454             SEXMDH = CEDH*0.4554;
455
456             SEXMSL = CESL*0.3737;
457             SEXMSM = CESM*0.4465;
458             SEXMSH = CESH*0.5030;
459             SEXML  = SEXMDL + SEXMSL;
```

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460  SEXMM  = SEXMDM + SEXMSM;
461  SEXMH  = SEXMDH + SEXMSH;
462  SEXFTL = SEXFL +SEXFM + SEXFH;
463  SEXMTL = SEXML +SEXMM + SEXMH;
464  SEXMPOP = ECC*0.443;
465  SEXFPOP = ECC*0.557;
466  AGE1DL = CEDL*0.8600;
467  AGE1DM = CEDM*0.8800;
468  AGE1DH = CEDH*0.8544;
469  AGE1SL = CESL*0.1740;
470  AGE1SM = CESM*0.0655;
471  AGE1SH = CESH*0.0301;
472  AGE1L  = AGE1DL + AGE1SL;
473  AGE1M  = AGE1DM + AGE1SM;
474  AGE1H  = AGE1DH + AGE1SH;
475  AGE2DL = CEDL*0.1143;
476  AGE2DM = CEDM*0.1042;
477  AGE2DH = CEDH*0.1316;
478  AGE2SL = CESL*0.4547;
479  AGE2SM = CESM*0.4073;
480  AGE2SH = CESH*0.2715;
481  AGE2L  = AGE2DL + AGE2SL;
482  AGE2M  = AGE2DM + AGE2SM;
483  AGE2H  = AGE2DH + AGE2SH;
484  AGE3DL = CEDL*0.0257;
485  AGE3DM = CEDM*0.0158;
486  AGE3DH = CEDH*0.014;
487  AGE3SL = CESL*0.3690;
488  AGE3SM = CESM*0.4462;
489  AGE3SH = CESH*0.5278;
490  AGE3L  = AGE3DL + AGE3SL;
491  AGE3M  = AGE3DM + AGE3SM;
492  AGE3H  = AGE3DH + AGE3SH;
493  AGE4DL = CEDL*0.0000;
494  AGE4DM = CEDM*0.000;
495  AGE4DH = CEDH*0.00;
496  AGE4SL = CESL*0.0313;
497  AGE4SM = CESM*0.0410;
498  AGE4SH = CESH*0.1708;
499  AGE4L  = AGE4DL + AGE4SL;
500  AGE4M  = AGE4DM + AGE4SM;
501  AGE4H  = AGE4DH + AGE4SH;
502  AGE1TL = AGE1L + AGE1M + AGE1H;
503  AGE2TL = AGE2L + AGE2M + AGE2H;
504  AGE3TL = AGE3L + AGE3M + AGE3H;
505  AGE4TL = AGE4L + AGE4M + AGE4H;
506  AGE1POP = ECC*0.3531;
507  AGE2POP = ECC*0.3187;
508  AGE3POP = ECC*0.2947;
509  AGE4POP = ECC*0.0335;
510  RACE0DL = CEDL*0.1103;
511  RACE0DM = CEDM*0.0975;
512  RACE0DH = CEDH*0.0755;
513  RACE0SL = CESL*0.1408;
514  RACE0SM = CESM*0.0610;
515  RACE0SH = CESH*0.0670;
516  RACE0L  = RACE0DL + RACE0SL;
517  RACE0M  = RACE0DM + RACE0SM;
```

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81

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518                RACEOM  = RACEODM + RACEOSM;
519                RACEBDL = CEDL*0.1625;
520                RACEBDM = CEDM*0.0635;
521                RACEBDH = CEDH*0.0420;
522                RACEBSL = CESL*0.1660;
523                RACEBSM = CESM*0.0710;
524                RACEBSH = CESH*0.0895;
525                RACEBL  = RACEBDL + RACEBSL;
526                RACEBM  = RACEBDM + RACEBSM;
527                RACEBH  = RACEBDH + RACEBSH;
528                RACEHDL = CEDL*0.3164;
529                RACEHDM = CEDM*0.1565;
530                RACEHDH = CEDH*0.0456;
531                RACEHSL = CESL*0.1596;
532                RACEHSM = CESM*0.0486;
533                RACEHSH = CESH*0.0726;
534                RACEHL  = RACEHDL + RACEHSL;
535                RACEHM  = RACEHDM + RACEHSM;
536                RACEHH  = RACEHDH + RACEHSH;
537                RACEWDL = CEDL*0.4108;
538                RACEWDM = CEDM*0.6825;
539                RACEWDH = CEDH*0.8376;
540                RACEWSL = CESL*0.5336;
541                RACEWSM = CESM*0.8194;
542                RACEWSH = CESH*0.7709;
543                RACEWL  = RACEWDL +RACEWSL;
544                RACEWM  = RACEWDM +RACEWSM;
545                RACEWH  = RACEWDH +RACEWSH;
546                RACEOTL = RACEOL + RACEOM + RACEOH;
547                RACEBTL = RACEBL + RACEBM + RACEBH;
548                RACEHTL = RACEHL + RACEHM + RACEHH;
549                RACEWTL = RACEWL + RACEWM + RACEWH;
550                RACEOPOP = ECC*0.0848;
551                RACEBPOP = ECC*0.0918;
552                RACEHPOP = ECC*0.1123;
553                RACEWPOP = ECC*0.7111;
554                UNITS1DL= CEDL*0.8977;
555                UNITS1DM= CEDM*0.8879;
556                UNITS1DH= CEDH*0.8787;
557                UNITS1SL= CESL*0.8410;
558                UNITS1SM= CESM*0.7289;
559                UNITS1SH= CESH*0.6739;
560                UNITS1L = UNITS1DL + UNITS1SL;
561                UNITS1M = UNITS1DM + UNITS1SM;
562                UNITS1H = UNITS1DH + UNITS1SH;
563                UNITS2DL= CEDL*0.0928;
564                UNITS2DM= CEDM*0.0935;
565                UNITS2DH= CEDH*0.0915;
566                UNITS2SL= CESL*0.1036;
567                UNITS2SM= CESM*0.1334;
568                UNITS2SH= CESH*0.1666;
569                UNITS2L = UNITS2DL + UNITS2SL;
570                UNITS2M = UNITS2DM + UNITS2SM;
571                UNITS2H = UNITS2DH + UNITS2SH;
572                UNITS3DL= CEDL*0.0095;
573                UNITS3DM= CEDM*0.0186;
574                UNITS3DH= CEDH*0.0298;
575                UNITS3SL= CESL*0.0554;
```

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```
576                    UNITS3SM= CESM*0.1377;
577                    UNITS4SM= CESM*0.1595;
578                    UNITS3L = UNITS3DL + UNITS3SL;
579                    UNITS3M = UNITS3DM + UNITS3SM;
580                    UNITS3H = UNITS3DH + UNITS3SH;
581                    UNITS1TL= UNITS1L + UNITS1M + UNITS1H;
582                    UNITS2TL= UNITS2L + UNITS2M + UNITS2H;
583                    UNITS3TL= UNITS3L + UNITS3M + UNITS3H;
584                    UNIT1POP = ECC*0.7960;
585                    UNIT2POP = ECC*0.1177;
586                    UNIT3POP = ECC*0.0863;
587
```

NOTE: THE VARIABLE R96 IS UNINITIALIZED.
NOTE: MISSING VALUES WERE GENERATED AS A RESULT OF PERFORMING
AN OPERATION ON MISSING VALUES.
EACH PLACE IS GIVEN BY: (NUMBER OF TIMES) AT (LINE):(COLUMN).

1 AT 322:25 1 AT 324:43 1 AT 325:23 1 AT 327:43 1 AT 328:23 1 AT 330:43 1 AT 331:25 1 AT 333:43
1 AT 334:23 1 AT 336:43 1 AT 337:23 1 AT 339:43 1 AT 348:25 1 AT 351:25 1 AT 384:26 1 AT 387:26
1 AT 423:24

NOTE: DATA SET WORK.A1 HAS 1 OBSERVATIONS AND 736 VARIABLES, 3 OBS/TRK.
NOTE: THE DATA STATEMENT USED 3.33 SECONDS AND 252K.

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587                PROC PRINT;
```

NOTE: THE PROCEDURE PRINT USED 1.82 SECONDS AND 320K AND PRINTED PAGES 1 TO 8.

NOTE: SAS INSTITUTE INC.
SAS CIRCLE
BOX 8000
CARY, N.C. 27511

FEES
CALIFORNIA COMMUNITY COLLEGES
1976 THRU 1981

	1976-77		1977-78		1978-79		1979-80		1980-81	
	$	NO. DIST.[a]	$	NO. DIST.	$	NO. DIST.	$	NO. DIST.	$	NO. DIST.
Fee Classes	$ 1,380,604	38	$ 1,033,895	25	$ 2,321,245	30	$ 2,404,281	29	$ 4,770,789	30
Development Center for Handicapped Fees	26,805	2	22,507	3	17,921	3	11,906	1	20,474	1
Out-of-District Fees	11,803	2	329,563	4	36,376	3	95,929	4	22,563	3
Health Fees	3,303,368	37	3,789,285	38	4,971,386	16	5,641,921	8	6,406,631	11
Parking Fees	1,540,076	24	1,579,879	22	1,805,816	23	2,189,385	22	3,107,662	24
Other Fees	1,540,295	49	3,175,184	58	4,515,861	61	5,798,262	63	4,876,898	61
Total	$ 8,802,951	70	$ 9,900,313	70	$13,668,605	70	$16,141,684	70	$19,205,017	70
Nonresident Tuition	11,490,738	68	13,633,386	67	17,825,712	69	22,559,576	69	32,346,416	69
TOTAL CHARGES	$20,293,689	70	$23,563,699	70	$31,494,317	70	$38,701,260	70	$51,551,433	70

[a] Number of districts charging fee.

ENROLLMENT AND ADA
CALIFORNIA COMMUNITY COLLEGES
1976 THRU 1981

	1976-77	1977-78	1978-79	1979-80	1980-81
ENROLLMENT					
Credit	1,074,658	1,117,990	1,048,756	1,100,681	1,189,976
Noncredit	183,058	203,749	111,063	147,778	193,260
TOTAL	1,257,743	1,321,739	1,159,819	1,248,459	1,383,236
ADA (Attendance)	736,702	734,915	658,716	688,591	749,563

SOURCE: Chancellor's Office Report CCAF 311.

Analytical Studies Unit
Chancellor's Office
California Community Colleges
December 10, 1981

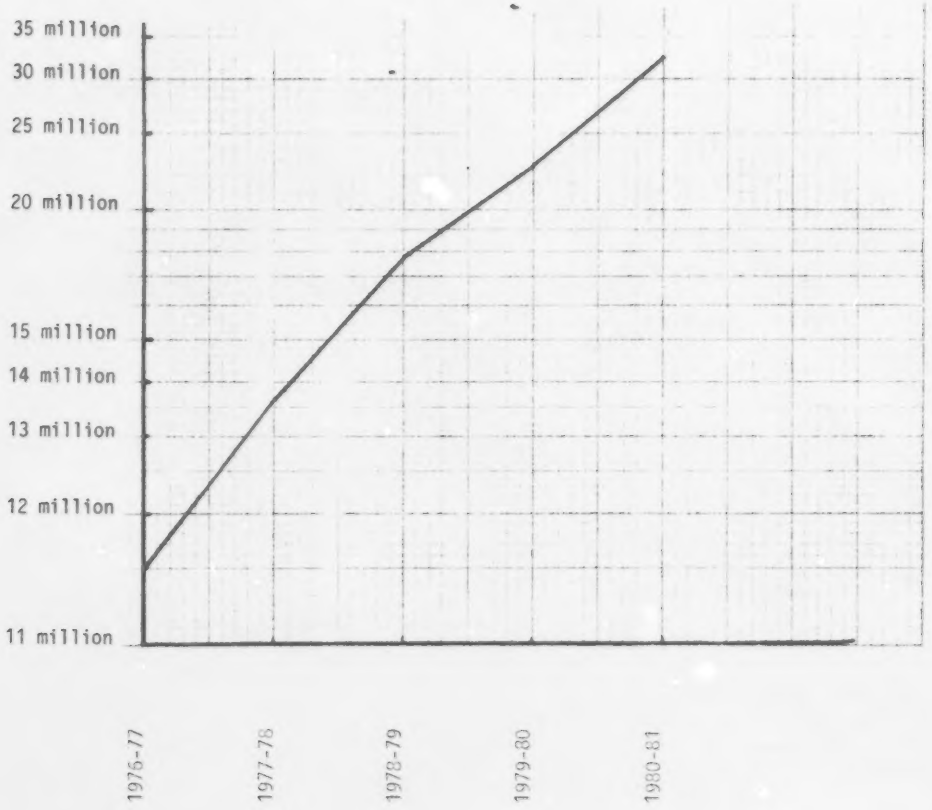
APPENDIX C

PERCENTAGE CHANGE OVER PREVIOUS YEAR
TOTAL FEES, ADA, AND PRICE INDEX
CALIFORNIA COMMUNITY COLLEGES

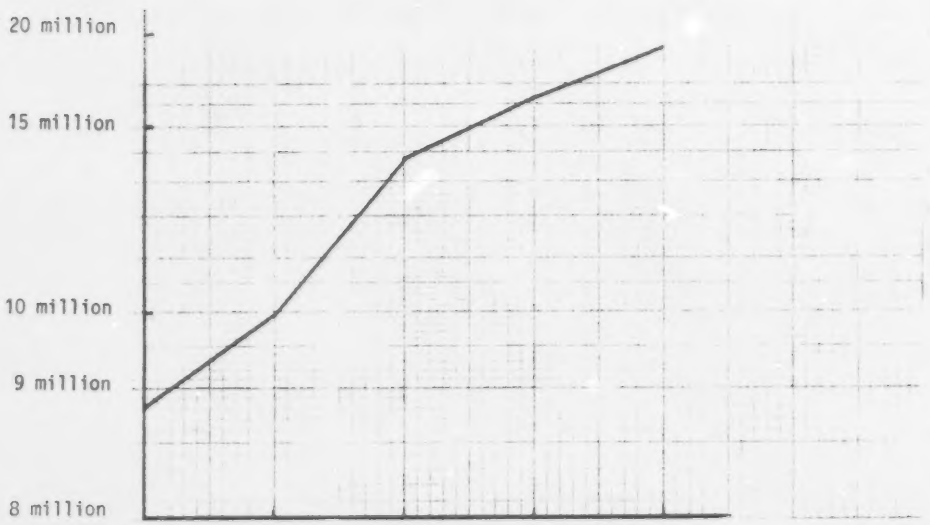
1976 THRU 1981

	1976-77	1977-78	1978-79	1979-80	1980-81	1976-77 to 1980-81
Nonresident Tuition	--	18.6	30.8	26.6	43.4	181.5
Total Charges	--	16.1	33.7	22.9	33.2	154.0
ADA	--	-(0.2)	-(10.4)	4.5	8.9	1.8
Price Index	6.5	6.7	7.7	9.9	10.8	39.9

TOTAL NONRESIDENT FEES (TUITION)

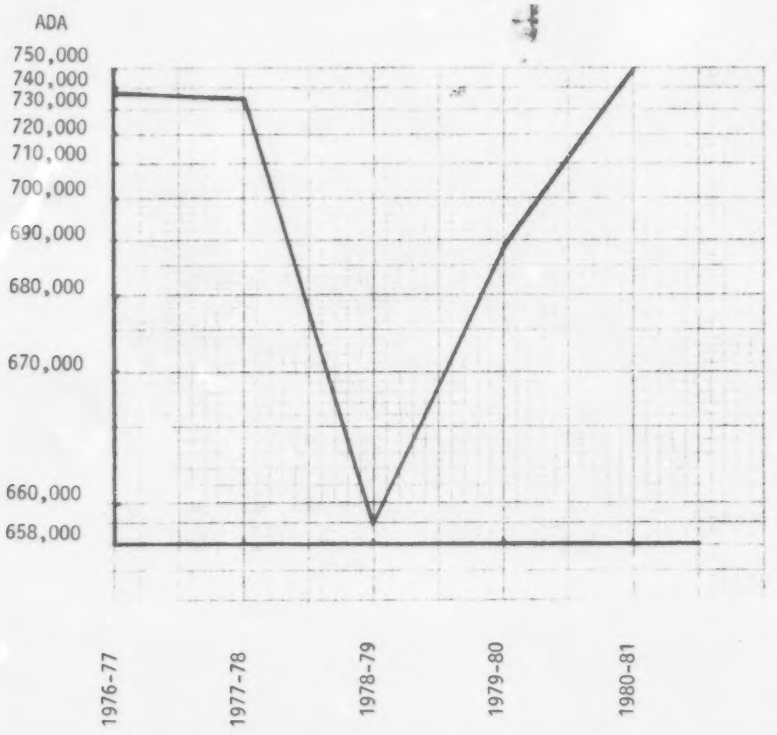


TOTAL RESIDENT FEES



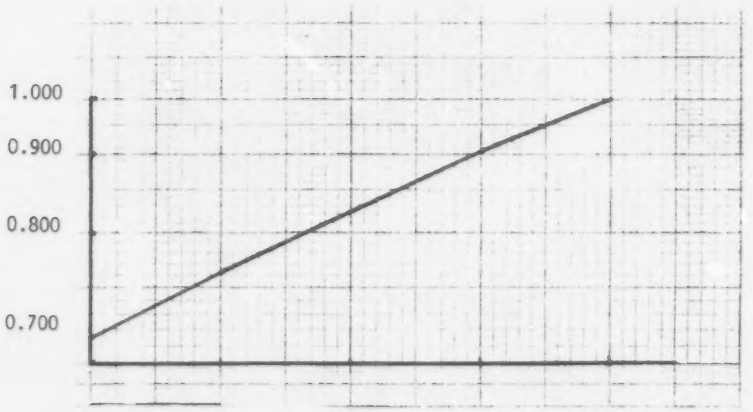
TOTAL ADA

CALIFORNIA
COMMUNITY
COLLEGES



PRICE INDEX

CALIFORNIA
COMMUNITY
COLLEGES



Analytical Studies Unit
Chancellor's Office
California Community Colleges
December 10, 1981

APPENDIX D

NATIONAL COMPARISON OF STUDENT FEES AND ENROLLMENT

Compared with public community colleges in other states, California's community colleges charge the lowest annual fee and have the highest participation rate (see Table 1).

California's community colleges charged $11, and enrolled 5.12 percent of the total state population in 1980-81. Other than California, fees ranged from $92 in Hawaii and $143 in North Carolina to a high of $903 in New York and $1,065 in Vermont.

The California State University (CSU) system is in a position similar to the community colleges when examined in a national perspective (see Table 2). Its annual fees were the lowest at $229 in 1980-81. Fees in other states ranged from a low of $335 in Hawaii and $376 in Texas to a high of $1,275 in Pennsylvania and $1,280 in Vermont.

Unlike either the community colleges or CSU system, the University of California (UC) does not charge the lowest fees nationally for its type of institution (see Table 3). The UC fee ranked just below average at $767 in 1980. In comparison, fees charged in other states ranged from a low of $422 in Texas and $478 in Hawaii to a high of $1,740 in Pennsylvania and $1,828 in Vermont.

SOURCE: Community college data are from the Community, Junior, and Technical College Directory: 1981. Data for other institutions of higher education are from a special run made by the National Center for Education Statistics. Population data for computation of participation rates are from the 1980 census of population, Bureau of the Census.

NOTE: The participation rate is measured by: $\frac{\text{enrollment}}{\text{state population}}$.
Fees are for full-time resident students for the enrire academic year.

TABLE 1
NATIONAL PUBLIC COMMUNITY COLLEGES
ENROLLMENT AND FEES
FALL 1980

STATE	ANNUAL FEES AVR.	RANK LOW - HIGH	LOW	HIGH	ENROLLMENT NO.	RANK	PART. RATE %	RANK	NO. COLLEGES
Alabama	$ 340	11	$ 300	$ 416	74,745	17	1.92	16	39
Alaska	420	23	340	572	13,693	39	3.42	4	12
Arizona	562	36	45	2,740	114,290	10	4.21	2	17
Arkansas	384	18	264	456	11,590	41	0.51	43	9
California	11	1	0	15	1,212,810	1	5.12	1	107
Colorado	528	32	293	644	41,962	23	1.45	24	12
Connecticut	358	15	347	407	41,987	22	1.35	27	17
Deleware	529	34	529	529	6,922	45	1.16	32	1
Florida	392	20	312	496	206,844	6	2.12	13	28
Gerogia	460	26	429	548	37,038	28	0.68	39	16
Hawaii	92	2	90	105	21,211	32	2.20	11	7
Idaho	440	24	400	480	4,178	47	0.44	44	2
Illinois	396	22	124	900	347,964	2	3.05	6	46
Indiana	736	45	660	810	29,166	31	0.53	42	14
Iowa	583	38	523	669	41,772	24	1.43	25	18
Kansas	394	21	224	500	36,889	29	1.56	21	20
Kentucky	479	27	390	696	20,956	33	0.57	41	13
Louisiana	274	7	16	372	14,241	38	0.34	46	5
Maine	678	43	525	1,020	8,509	43	0.76	38	8
Maryland	542	35	281	825	91,690	14	2.18	12	19
Massachusetts	528	33	447	687	72,957	18	1.27	29	17
Michigan	524	31	320	726	208,037	5	2.25	10	29
Minnesota	615	40	419	1,467	39,636	25	0.97	36	21
Mississippi	349	13	280	490	37,469	27	1.49	23	16
Missouri	373	17	210	480	53,994	19	1.10	34	13
Montana	273	6	195	338	2,956	48	0.38	45	3
Nebraska	498	30	402	707	29,294	30	1.87	17	9
Nevada	391	19	390	395	19,931	34	2.49	8	4
New Hampshire	639	42	625	652	6,176	46	0.67	40	2
New Jersey	566	37	370	634	102,619	13	1.39	26	16
New Mexico	260	5	0	3,484	16,643	35	1.28	28	8
New York	903	47	670	1,100	263,198	4	1.50	22	43
North Carolina	143	3	0	184	104,360	12	1.78	18	56
North Dakota	636	41	534	822	7,525	44	1.15	33	6
Ohio	886	46	420	1,280	149,661	8	1.39	26	52
Oklahoma	369	16	240	1,050	49,022	20	1.62	19	15
Oregon	446	25	399	510	76,942	16	2.92	7	13
Pennsylvania	724	44	616	880	79,396	15	0.67	40	11
Rhode Island	494	29	494	494	11,844	40	1.25	31	1
South Carolina	489	28	330	800	39,432	26	1.26	30	22
South Dakota	--	--	--	--	--	--	--	--	--
Tennessee	319	10	270	360	44,998	21	1.00	34	12
Texas	207	4	108	394	280,691	3	1.97	15	71
Utah	446	25	192	552	14,594	37	1.00	35	5
Vermont	1,065	48	670	1,460	2,609	49	0.51	43	2
Virginia	354	14	305	600	111,548	11	2.09	14	27
Washington	312	8	293	342	171,760	7	4.16	3	27
West Virginia	346	12	288	400	16,582	36	0.85	37	8
Wisconsin	592	39	275	856	147,376	9	3.13	5	41
Wyoming	313	9	170	380	11,245	42	2.43	9	7
(MEDIAN	443)								

TABLE 2
NATIONAL PUBLIC COLLEGE SYSTEMS
WITHOUT DOCTORAL PROGRAMS

FALL 1980

STATE	ANNUAL FEES AVERAGE	ANNUAL FEES RANK LOW - HIGH	ENROLLMENT CREDIT	PARTICIPATION RATE %	PARTICIPATION RANK	NO. OF INSTITUTIONS
Alabama	$ 647	20	32,723	0.84	11	11
Alaska	--	--	--	--	--	--
Arizona	--	--	--	--	--	--
Arkansas	553	13	29,879	1.31	2	8
California	229	1	183,021	0.77	13	17
Colorado	684	22	27,648	0.96	7	7
Connecticut	748	26	21,284	0.69	18	5
Deleware	470	8	1,565	0.26	35	1
Florida	742	25	26,731	0.27	34	5
Georgia	623	18	40,019	0.73	15	14
Hawaii	335	2	3,091	0.32	32	2
Idaho	465	7	10,079	1.07	5	2
Illinois	793	29	35,578	0.31	33	6
Indiana	880	33	27,354	0.50	26	8
Iowa	--	--	--	--	--	--
Kansas	681	21	15,863	0.67	19	4
Kentucky	560	14	40,174	1.10	3	6
Louisiana	531	10	31,656	0.75	14	7
Maine	1,053	42	8,630	0.77	13	6
Maryland	919	34	29,371	0.70	17	8
Massachusetts	788	28	46,073	1.09	4	12
Michigan	1,022	41	50,895	0.55	24	8
Minnesota	825	31	43,483	1.07	5	9
Mississippi	741	24	9,348	0.37	31	4
Missouri	428	5	47,678	0.97	6	9
Montana	508	9	6,896	0.88	8	4
Nebraska	696	23	9,553	0.61	21	4
Nevada	--	--	--	--	--	--
New Hampshire	1,100	43	5,537	0.60	22	2
New Jersey	976	38	62,291	0.85	10	8
New Mexico	540	12	5,703	0.44	29	3
New York	990	40	127,561	0.73	15	23
North Carolina	578	15	42,559	0.73	15	12
North Dakota	533	11	4,877	0.75	14	4
Ohio	961	37	24,895	0.23	36	4
Oklahoma	437	6	32,414	1.07	5	10
Oregon	935	35	9,976	0.38	30	4
Pennsylvania	1,275	44	61,132	0.52	25	18
Rhode Island	782	27	4,411	0.47	27	1
South Carolina	796	30	22,548	0.72	16	9
South Dakota	864	32	5,981	0.87	9	4
Tennessee	617	16	14,032	0.31	33	3
Texas	376	3	64,097	0.45	28	17
Utah	632	19	11,554	0.79	12	2
Vermont	1,280	45	3,283	0.64	20	3
Virginia	980	39	30,691	0.57	23	9
Washington	618	17	22,672	0.55	24	4
West Virginia	382	4	14,209	0.73	15	1
Wisconsin	952	36	64,169	1.36	1	11
Wyoming	--	--	--	--	--	--

(MEDIAN 696)

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TABLE 3

NATIONAL PUBLIC RESEARCH UNIVERSITIES
FALL 1980

STATE	ANNUAL FEES AVERAGE	ANNUAL FEES RANK LOW - HIGH	ENROLLMENT	PARTICIPATION RATE	PARTICIPATION RANK	NO. OF INSTITUTIONS
Alabama	$ 785	22	48,082	1.24	21	5
Alaska	572	6	2,213	0.08	46	1
Arizona	600	9	56,734	2.09	3	3
Arkansas	659	13	12,683	0.56	41	2
California	767	21	151,874	0.64	39	12
Colorado	910	28	49,387	1.71	9	6
Connecticut	1,068	38	14,358	0.46	44	1
Deleware	998	35	13,731	2.31	1	1
Florida	742	19	63,038	0.65	38	4
Georgia	844	25	40,299	0.74	35	4
Hawaii	478	2	15,056	1.56	13	1
Idaho	484	3	10,704	1.13	25	2
Illinois	933	31	104,629	0.92	30	7
Indiana	983	33	87,113	1.59	11	5
Iowa	812	23	42,961	1.48	17	3
Kansas	730	18	41,518	1.76	7	4
Kentucky	677	14	29,638	0.81	32	2
Louisiana	571	5	65,895	1.57	12	7
Maine	1,110	41	9,082	0.81	32	1
Maryland	889	27	40,004	0.95	28	5
Massachusetts	1,037	37	27,212	0.47	43	2
Michigan	1,288	46	128,466	1.39	19	7
Minnesota	1,132	42	46,687	1.15	23	1
Mississippi	873	26	33,821	1.34	20	5
Missouri	840	24	38,093	0.78	33	4
Montana	608	11	15,903	2.02	4	2
Nebrasks	915	29	30,615	1.95	6	3
Nevada	720	17	12,015	1.50	16	2
New Hampshire	1,416	47	9,786	1.06	26	1
New Jersey	1,165	44	32,691	0.44	45	5
New Mexico	680	12	25,633	1.97	5	3
New York	1,098	40	91,589	0.52	42	15
North Carolina	592	9	44,883	0.76	34	4
North Dakota	648	12	14,395	2.21	2	2
Ohio	1,135	43	159,947	1.48	17	9
Oklahoma	605	10	36,814	1.22	22	3
Oregon	943	32	36,722	1.40	18	4
Pennsylvania	1,740	48	73,645	0.62	40	5
Rhode Island	1,235	45	9,904	1.05	27	1
South Carolina	1,089	39	26,488	0.85	31	3
South Dakota	927	30	11,703	1.70	10	3
Tennessee	586	7	68,384	1.51	15	7
Texas	422	1	197,068	1.39	19	19
Utah	760	20	25,324	1.73	8	2
Vermont	1,828	49	7,896	1.54	14	7
Virginia	987	34	60,799	1.14	24	6
Washington	687	16	39,229	0.95	28	2
West Virginia	492	4	14,209	0.73	36	1
Wisconsin	1,004	36	44,436	0.94	29	2
Wyoming	592	8	7,271	1.54	14	1

(MEDIAN 844)

Analytical Studies Unit
Chancellor's Office
California Community Colleges
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APPENDIX E

DISTRIBUTIONAL IMPACT OF CALIFORNIA COMMUNITY COLLEGES

This paper addresses the distributional impact of community college education in California; i.e., who pays for and who benefits from this segment of public postsecondary education.

How are community college resources and services distributed? How does the notion of taxpayer and consumer equity embodied in the Serrano-Priest decision relate to more general notions of resource distribution? What are the redistributional effects of existing community college finance policies, particularly that policy of zero tuition and low fees? These questions, while largely subjective, can be analyzed in a systematic fashion.

ANALYTICAL MODEL

These questions deal with distribution, equity and equality. Board of Governors' goals include "equal opportunity for access to quality community college education for all eligible individuals in California irrespective of age, sex, race, or ancestry; economic, cultural, or physical condition; previous educational experience; or geographic location". This has to do with the equal opportunity to benefit from actual attendance at a college. Also of concern is the impact on those who don't actually attend but benefit at least indirectly from the existance of community college education. These individuals also may pay either through taxes or other ways.

Here, effectiveness or economic efficiency is assumed: that is, benefits provided are those within the community college mission, are appropriate to the needs and preferences of constituents, and are delivered in a cost-efficient manner by the colleges.

Efficiency and equity are interrelated, though decidedly different concepts. There are objective standards to determine whether or not the provision of community college education is economically efficient. By contrast, whether the benefits (and costs) of this education are equitably distributed is a matter of ethical judgment and, therefore, essentially subjective. Distributional equity is the appropriate treatment of unequals (as well as equals) and implies that whatever is being distributed is in accordance with principles of justice (Bronfenbrenner, 1973).

Equality (and inequality) is also distinct from equity. While the latter is subjective, the former is objective; though Boulding (1973) argues that even the appropriate definition or measure of equality is subject to the evaluative perceptions of individuals.

Most discussions of equality in education have dealt with the notion that it (equality) can be achieved only by compromising quality, an erroneous "either-or" context. The Board goal cited above incorporates both notions. Martin (1976) correctly observes that "quality may endure without equality but equality cannot survive without quality."

The distribution of benefits and costs of California Community College education can be objectively determined, albeit with considerable difficulty. Whether this distribution is, in some sense, "correct," is a purely subjective matter. One way out of this dilemma may be to assess the distribution in relation to concensus interpretations of Board of Governors' goals and/or "commonly-held" perceptions of what the distribution ought to be.

A basic measure to answer distributional questions is the change in net well-being experienced by differently-situated individuals as a result of community college education in California. This change in net well-being (benefits less cost) depends largely on (a) the characteristics and distribution of material

and psychological community college benefits; (b) the vertical and horizontal incidence (after shifting) of federal, state and local taxes, (c) time and expense incurred by students and their families or sponsors; and (d) changes in relative prices of those goods and resources bought and sold by individuals as a result of the provision of community college education.

This analysis is complicated by the fact that benefits (and occasionally costs) accrue across generations. Taxpayers and/or students purchase educational benefits that are not forthcoming in some cases until years later.

Benefits from community college education may be categorized in at least three different ways. First, they are both psychological and material. Second, they are both consumption: enjoyed while the education is going on; and investment: forthcoming over a period of years after one's education is complete. Third, benefits of community college education are both private and social or collective.

Private benefits include those which accrue solely to present or past students, such as additional earnings resulting from education. Collective benefits, by contrast, are enjoyed (within certain limitations such as geography, etc.) by all individuals whether or not they've attended college. By definition, collective benefits are those which can't be withheld from individuals through the mechanism of pricing in the marketplace. Since individuals can't be excluded from at least part of college's benefits, true preferences are understated and the market mechanism fails to produce an optimal amount of education. The public sector steps in to correct this situation.

Such collective or social benefits are difficult to measure. In fact, their very existance has been the subject of considerable debate. In any case, the primary components of such benefits appear to be

(a) that part of economic growth contributed by college but not solely benefitting private firms and former students;

(b) growth in the store of knowledge,

(c) informal education of children by better educated parents,

(d) increases in ability of citizens to communicate,

(e) reduced crime, and

(f) increases in 1) cultural attainment and socialization, 2) voluntary or charitable work, and 3) political participation.

Hansen (1973) suggests an agenda for measuring private and social benefits, based upon work by Astin (1972) and others. Major difficulties are the attribution of collective benefits to non-students and the extended time period during which benefits accrue to students, former students, and others.

A means of assessing the private component of college benefits is to assume that individuals make efficient choices about attendance and then to measure the present value they attribute to college education. This is accomplished by calculating the demand for college exerted at different price levels. Individuals compare the benefits and costs of college and as long as the former exceeds the latter, they attend. (See analysis in Appendix A.) A complicating factor is that these preferences are consciously altered by the public subsidy to "correct" for (1) the collective benefits, (2) "merit" adjustments for what is presumed by policymakers to be distorted private demand for college due to lack of information and uncertainty facing potential students (Head, 1966), and (3) imperfections in the market for financing human capital: physical capital has a built-in advantage (Daniere, 1964).

Costs may be similarly distinguished, though easier to measure. They are both psychological and material; but, in contrast to benefits, generally confined to the period of time during which students attend. Private costs include earnings and leisure foregone by individuals in order to attend plus "out-of-pocket"

expenditures such as transportation, tuition and fees, and books, supplies and other miscellaneous costs individuals incur only because they are students. The public cost or subsidy is made up of those federal, state and local taxes which support community colleges. Subsidies are paid to students (in the case of financial aid or vouchers) or to institutions to cover the cost of instruction, research and public service.

The question of who pays for the public subsidy is resolved by determining the incidence of each tax after its burden has been shifted. Often those taxed are able to shift the cost on to others. Two concepts of incidence are important: horizontal and vertical.

The now-famous Serrano-Priest decision deals primarily with horizontal incidence: similarly situated taxpayers in different districts should be able to "purchase" equivalent amounts of education for their children with equivalent taxes. More generally, these questions should deal with inter-district differences in tax burdens (not just tax rates) and the extent to which the benefits of (community college) education are distributed within or extend beyond district boundaries.

Vertical incidence, by contrast, deals with the full range of taxpayers at all income levels whether in the same or different jurisdictions. Taxes are progressive if they take a larger percentage of the income of those in higher income brackets and regressive if the reverse is true. Neutral taxes comprise the same percentage of income at all levels of income.

Thus, the distributional analysis should measure the net change in well-being for differently-situated individuals as a result of community college education. There is the need to account for the intergenerational context: parents subsidize their children; college expenditures purchase benefits which are not forthcoming until years later. While most such analyses use family income, many or all of the categories cited by the Board of Governors in its goal statement on equal opportunity could be used. These categories include racial and ethnic background, sex, age, ability, prior education, experience, and geographic background.

EVIDENCE

Empirical evidence for such calculations is largely incomplete. Few analysts have been able to measure the impact of collective benefits, much less distribute them over different socio-economic categories of individuals. As theoretically defined, these benefits are enjoyed by all since no one can be prevented by pricing from enjoying such benefits. However, it appears likely that elements of geography and culture may act so as to keep what is defined as the collective benefits from being enjoyed universally. Even fewer analysts have examined the non-monetary private returns accruing to students or former students. The same lack of information pertains to the leisure and, to a lesser extent, to the foregone income components of private costs.

Little analysis has been made of the incidence of those federal, state, and local taxes which specifically subsidize college costs. The numerous tax types comprising this subsidy for community colleges render such analysis difficult but necessary.

Hensen and Weisbrod (1969) and Adams (1977) examine the benefits and costs resulting from public higher education in California and Michigan, respectively, and conclude that low income groups subsidize high income groups. Both studies confine their benefits measure to just the private returns that accrue to students and their families. Costs are measured solely by the public tax subsidy.

The Hansen-Weisbrod conclusion was derived by looking separately at students and nonstudent families for the university, state college and community colleges in California during 1964-65. The authors argue that the impact of the four-year institutions is regressive while that of the community colleges is approximately neutral. Nonstudent families received no (private) benefit, paid taxes, and were, not surprisingly, more often low income than were the student or "using" families. Both Pechman (1970) and Machlis (1973) reach opposite conclusions using the same data. This is because they calculate net benefits for each income class rather than calculating the median income for each group of users and nonusers as do Hansen and Weisbrod.

Aside from incomplete measurement of costs and benefits, analytical problems in these studies are due also to the life cycle pattern of college attendance and earnings. Parents of college students typically are at their earnings peak. Other things being equal, these parents will have incomes higher than the general tax-paying public solely because of the age difference. Thus, even if financial aids provided ample opportunities for college attendance among the poor and even if the tax system was highly progressive, age differences between "using" and "non-using" families could produce a series of net benefit calculations that appear regressive with respect to family income.

No analysis has yet solved this time period problem. Pechman (1972) contends that there's no practical way of deriving a distribution of benefits or burdens for higher education since those who benefit are not the same persons who pay the costs. (He apparently rules out the existence of collective benefits and ignores the cost to the student of foregone earnings.) Pechman also argues that tax incidence should be analyzed for its general relationship to all public activities, rather than its specific relationship to just higher education.

Hartman (1972) attempts to solve the intergenerational problem while looking at loan versus tax subsidies. This he does by comparing the present value of loan repayments to permanent income at various income levels. He concludes that conventional (fixed repayment) loans are more regressive than variable (with respect to income) loans which, in turn, are more regressive than state-local tax structures. Conlisk (1977) employs a simultaneous equation model to estimate intergenerational changes in income that may be attributed to a college education. While his findings are inconclusive, he does concur that the usual net benefit calculations are poor indicators of higher education's impact on income distribution.

Costs (other than foregone earnings) are borne in part by parents and taxpayers of Generation 1 while the benefits accrue to students and others, most of whom

are members of Generation 2. This is complicated by the fact that parents and taxpayers of Generation 1 are enjoying the benefits of education which was taken (or for which costs were incurred) during a prior generation. This is further complicated (or simplified?) by the increasing tendency toward life-long learning, particularly in community colleges. Parents and taxpayers are simultaneously students. They enroll for job-related retraining or upgrading, avocational skills, to improve social, cultural or consumer capabilities or perhaps simply to discover ways to fill their increasing leisure time. The "intergenerational transfer" problem described by Pechman is less significant for community colleges than the four-year institutions and may become less of a problem for all of postsecondary education as time goes by.

The community colleges appear to be utilized as a "redistributive" (toward lower income) tool to a greater extent than are the four-year colleges and universities. This is due as much to admissions policies as it is due to cost differences. High correlations between family income and students' ability and prior education are found in virtually all studies on these topics (see, for example, Wolfle (1973), Taubman and Wales (2974), and Hause (1975)). This relationship and the more rigorous four-year admissions requirements, together with cost differences, result in four-year students being more often from high income backgrounds than community college students.

The results of these differences in fees and admissions requirements can be observed in data on full-time undergraduates in California public institutions (see Table 1). Resulting enrollment differences, as measured by both demographic and economic factors, are dramatic. Among total undergraduate enrollment, the proportion of middle and upper income students dependent on parents' income is greatest at the university (62.0%) and the state university (62.3%), and the least at the community colleges (24.1%). (See Table 2.)

A more in-depth examination of the community college impact is seen in Table 3 where the 1979 household incomes of California students and nonstudents are compared. Those currently enrolled report slightly higher incomes than those who have never enrolled, but lower incomes than those formerly enrolled. This illustrates the age-income problem noted above.

TABLE 1

STUDENT CHARACTERISTICS
UNIVERSITY (UC), STATE UNIVERSITY (CSU) AND
COMMUNITY COLLEGES (CCC);
UNDERGRADUATES, 1979

CHARACTERISTICS	CCC	CSUC	UC
		(Percent)	
Male	45%	50%	52%
Female	55	50	48
White	70%	75%	74%
Minority	28	23	23
Nonresident	2	2	3
Married	29%	24%	13%
Never Married	56	68	83
Other (divorced, wodowed, etc.)	14	8	4
		(average age)	
AGE			
Male	28	21	19
Female	30	21	19
		(Percent)	
DEPENDENTS			
0 (number)	68%	81%	92%
1	13	8	5
2	11	7	2
>3	8	4	1
WORK			
0 (hours per week)	23%	24%	40%
1 - 19	24	26	37
20 - 39	26	31	18
≥40	27	19	5
FULL-TIME ENROLLMENT	26%	71	91%
PART-TIME ENROLLMENT	74	29	9
FULL-TIME STUDENTS PARENT INCOME			
$0 - $11,999 (per year)	46%	21%	11%
$12,000 - $23,999	28	28	19
>$24,000	26	51	70
SELF-SUPPORTING	66%	30%	15%
DEPENDENT ON PARENTS/OTHERS	34	70	85

SOURCES: College Entrance Examination Board. Student Economics and Resources Survey (SEARS), January 1980.
California Postsecondary Education Commission. Information Digest, 1980.

TABLE 2

ESTIMATES OF ECONOMIC STATUS AND INCOME
UNIVERSITY (UC), STATE UNIVERSITY (CSU),
COMMUNITY COLLEGES (CCC)
CALIFORNIA UNDERGRADUATES
PUBLIC
FALL 1980

	CCC		CSU		UC	
ANNUAL INCOME	ENROLL.	%	ENROLL.	%	ENROLL.	%
DEPENDENT						
< $12,000	140,974	10.1%	12,044	12.9%	4,040	7.8%
$12,000-29,999	222,899	16.0	30,935	33.2	13,399	25.9
$30,000	112,045	8.1	27,092	29.1	18,708	36.1
SELF-SUPPORTING						
< $ 5,500	200,433	14.4	9,474	10.2	6,178	11.9
$5,500-10,799	590,828	42.5	11,955	12.8	8,419	16.2
≥ $10,800	123,807	8.9	1,612	1.7	1,085	2.1
TOTAL	1,390,986		93,112		51,829	

SOURCE: See Table 1.

TABLE 3

HOUSEHOLD INCOME
AND COMMUNITY COLLEGE ENROLLMENT
CALIFORNIA, 1979

GROSS ANNUAL INCOME	CURRENTLY ENROLLED	FORMERLY ENROLLED	NEVER ENROLLED	(NOT CURRENTLY ENROLLED)
$0 - 4,499	7.7%	4.0%	5.9%	5.1%
$5,000 - 7,499	6.5	4.4	11.3	8.4
$7,500 - 9,999	8.5	7.6	15.4	12.1
$10,000 - 14,999	15.0	13.9	15.2	14.7
$15,000 - 24,999	35.0	30.8	24.0	26.9
> $25,000	27.3	39.3	28.1	32.8
NUMBER	260	1,235	1,693	2,928
GINI INDEX[a]	.277	.374	.214	.281

SOURCE: Field Research Corporation. A Survey of California Public Attitudes Toward Community Colleges. San Francisco, 1979.

[a] The Gini Index is calculated by taking the cumulative distribution, subtracting this from the cumulative equal distribution, adding these deviations and dividing by the sum of the cumulative equal distribution (see Boulding, 1973).

Notably, the income distribution of those not currently enrolled in community colleges is nearly the same as those currently enrolled. Thus, if collective benefits from community college education are of equal value to all California adults, the redistributive impact of community colleges can be determined by examining the incidence of those taxes which support the colleges.

Over two-thirds of those revenues supporting the colleges are from the California State General Fund. This Fund is made up of personal income, bank and corporation income, and sales taxes along with a number of other smaller levies such as inheritance, tobacco, and liquor taxes (see Table 4).

While no comprehensive up-to-date incidence studies are available, the California personal income tax appears to be distinctly progressive (see Table 5). Most studies indicate, as well, that the income tax is not shifted since hours worked and savings appear to be independent of changes in income taxation (see Pechman and Okner, 1974).

The California sales tax excludes food and medicine. Even so, it is generally thought to fall more heavily on those in lower income brackets (see Table 5). This is because these individuals spend a greater proportion of their income on both taxed and untaxed items than do those with higher incomes. Consequently, Pechman and Okner (1974), among others, would argue that this tax is regressive. Even this apparently unequivocal conclusion is subject to interpretation. Davies (1960), for instance, was able to show that the California sales tax, while regressive with respect to current income, was progressive with respect to disposible income (current income plus transfer payments, and changes in assets and liabilities).

TABLE 4

INSTITUTIONAL REVENUE SOURCES
CALIFORNIA COMMUNITY COLLEGES
1979-80

SOURCE	DOLLARS (in millions)	%
State General Fund	$ 1,023	(67)
Personal Income Tax		25
Sales Tax		25
Bank and Corporation Tax		10
Other Taxes		7
Local Property Taxes	345	22
Federal Tax Revenues	116	8
Student Tuition and Fees	39	3
TOTAL	$ 1,523	

SOURCES: State of California, Controller's Report, 1980; State of California, Governor's Budget, 1981-82.

TABLE 5

TAXES PAID BY INCOME LEVEL
CALIFORNIA

	TAX AS PERCENT OF ADJUSTED GROSS INCOME		
INCOME	STATE PERSONAL INCOME (1979)	SALES (1972)	PROPERTY (1974)
$0 - 5,000	0.1%		
$5,000		4.2%	8.4%
$5,000 - 7,500	0.6		
$7,500		3.4	7.6
$7,500 - 10,000	0.9		
$10,000		2.9	5.7
$10,000 - 15,000	1.7		
$15,000		2.3	4.0
$15,000 - 25,000	2.5		
$25,000		1.9	3.0
$25,000	5.0		
$50,000		1.2	2.8

SOURCE: Franchise Tax Board, Annual Report, Sacramento, 1980.
Assembly Revenue and Taxation Committee Hearing, Impact Data, Long Beach, October 21-22, 1976.

Determining the incidence of the bank and corporation income tax is an even more complex problem. This tax may be shifted to owners of corporate capital, forward to consumers, or backward to labor, depending upon the firm's objectives and competitive market situation. The problem is further complicated, for California, by the possible shifting of this tax to out-of-state stockholders, workers, and consumers. Empirical evidence on the incidence of this tax is generally inconclusive.

For many years, the property tax was thought to be regressive. The tax, it was argued, falls initially on property owners who shift the incidence by lowering the supply of goods and services, including housing. Since lower income households spend more of their income on all items, including housing, the property tax would be regressive (see Table 5).

A more recent view holds, like the old view, that some of the property tax can be shifted depending on the character of the local market. However, many property owners, when taxed, divert their capital to nontaxed uses, reducing the return to those uses and, thereby, spreading the burden among all owners of capital (see Mieskowski, 1972, and Aaron, 1975). More than half of California property taxes are paid by firms, rather than residential owners. In fact, just 34.3 percent of 1975 California property taxes were paid by owners of single-family residences. The proportion of property taxes paid by residential property owners has increased as a result of Proposition 13 (1978) but is still less than half the total. Empirical evidence supporting the old view is based largely on residential property tax incidence. To the degree that the property tax falls on owners of capital, it (the tax) can be expected to be progressive.

While not conclusive, arguments about the four major state taxes which subsidize California Community Colleges suggest an overall tax base that likely ranges from neutral to progressive in its incidence. Added revenue from the more progressive federal tax structure would reinforce this conclusion. Therefore, the general long-term impact of the colleges should be a neutral or progressive redistribution of net well-being in the form of opportunities and collective benefits.

Even if the allocation is not efficient; i.e., if some tax subsidies purchase private benefits for students, the distributive consequences still should range from neutral to progressive. This is because higher income taxpayers are subsidizing community college education for students who are from generally the same or lower income backgrounds.

STUDENT CATEGORY REPORT

SEGMENT	STUDENT LEVEL	STUDENT CATEGORY	CURRENT ENROLL	FEE INC ($)	NEW FEE ($)	WITHOUT AID: HEAD COUNT LOSS	WITHOUT AID: TUITION REVENUE ($M)	WITHOUT AID: ENROLL* REDUCTS ($M)	WITH AID: STUDENT AID NEEDED	WITH AID: HEAD COUNT RETAIN	WITH AID: NET ENROLL LOSS	WITH AID: NET TUITION REVENUE ($M)	WITH AID: NET ENROLL* REDUCTS ($M)
CCC	LOWER RES. FULL-TIME			50.0	50.0								
			294380			8057	14.316	9.910	3.123	4691	3366	11.428	4.140
		RES. 6.1-11.9		50.0	50.0								
			246960			11451	14.775	8.624	1.189	7516	3936	10.963	2.964
		RES. 6 OR FEWER		30.0	30.0								
			838325			29871	24.254	8.607	0.0	0	29871	24.254	8.607
	TOTAL		1379665			49380	50.345	27.141	4.311	12207	37173	46.644	15.711
	PCT					3.6					2.7		
TOTAL			1379665			49380	50.345	27.141	4.311	12207	37173	46.644	15.711
PCT						3.6					2.7		

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APPENDIX F

*REDUCTIONS IN STATE GENERAL FUND SUPPORT BASED ON FTE ENROLLMENT LOSSES AND THE FOLLOWING EXPENDITURES PER FTE STUDENT: UC=$3,000 CSLC=$2,000 CCC=$1,275. $80 PELL GRANT REDUCTIONS

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